



Moisture Monitor™ Series 3

Panametrics Hygrometer

Programming Manual



Moisture Monitor™ Series 3 *Panametrics Hygrometer*



Programming Manual

910-110PC

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The *Moisture Monitor™ Series 3 Hygrometer* is a GE Panametrics product. GE Panametrics has joined other GE high-technology sensing businesses under a new name—GE Sensing & Inspection Technologies.



Warranty

Each instrument manufactured by GE Sensing, Inc. is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the instrument to normal operation or replacing the instrument, at the sole discretion of GE. Fuses and batteries are specifically excluded from any liability. This warranty is effective from the date of delivery to the original purchaser. If GE determines that the equipment was defective, the warranty period is:

- one year for general electronic failures of the instrument
- one year for mechanical failures of the sensor

If GE determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by GE, the repairs are not covered under this warranty.

The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties of merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).

Return Policy

If a GE Sensing, Inc. instrument malfunctions within the warranty period, the following procedure must be completed:

1. Notify GE, giving full details of the problem, and provide the model number and serial number of the instrument. If the nature of the problem indicates the need for factory service, GE will issue a RETURN AUTHORIZATION number (RA), and shipping instructions for the return of the instrument to a service center will be provided.
2. If GE instructs you to send your instrument to a service center, it must be shipped prepaid to the authorized repair station indicated in the shipping instructions.
3. Upon receipt, GE will evaluate the instrument to determine the cause of the malfunction.

Then, one of the following courses of action will then be taken:

- If the damage is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
- If GE determines that the damage is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the instrument will be repaired and returned.

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Chapter 1

Features and Capabilities

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Introduction

The GE Sensing Moisture Monitor **MMS-3** is a one- or two-channel analyzer designed to measure dissolved moisture concentration in gases and non-aqueous liquids, and dissolved oxygen concentration in gases.

A microprocessor-based instrument, the **MMS-3** combines hardware and software to make various measurements. The user connects the needed inputs (moisture probes, pressure transmitters, oxygen cells, etc.) to the back panel of the electronics unit using the appropriate cables. Typically, the user installs moisture probes and oxygen cells into the process using a sample system that is specifically designed for the application. The sample system delivers a sample of the process gas or liquid to the probes. The probes then send signals to the **MMS-3** electronics unit, which interprets the signals and converts them into measurements.

The complete analyzer, including electronics, cables and measurement probes, forms a “system” that is designed to monitor the process accurately and reliably. The following sections discuss each part of this “system.”

Electronics Unit

The center of the “system” is the electronics unit. The electronics unit has many components, including the terminal blocks for all connections, an RS232 port, a Liquid Crystal Display (LCD), a keypad, and menu keys (see Figure 1-1 on page 1-2). The **MMS-3** is also available with an optional battery pack.

The back panel of the electronics unit consists of the terminal blocks for connecting moisture probes, oxygen cells, recorders and optional alarms (standard or hermetically sealed). The **MMS-3** also provides connections for two isolated outputs per channel. Input connections for the M and TF Series moisture probes, as well as the Delta F oxygen sensors, are intrinsically safe.

As an optional feature, the **MMS-3** provides connections for two auxiliary inputs (not intrinsically safe) for each channel. The auxiliary inputs can accept signals from any 0/4 to 20-mA or 0 to 2-VDC device, including other GE Sensing analyzers.

The RS232 port enables the user to connect a remote terminal, printer, or computer to the **MMS-3**. Using an optional PanaView™ software package, the user can also set up and operate one or more analyzers from a remote location, program user functions, transfer data, and create data logs.

Electronics Unit (cont.)

The front panel of the electronics unit contains a 2-line x 20 character Liquid Crystal Display (LCD) to show measurements, a 4 x 4 matrix keypad for entering data and operating the **MMS-3**, and four function keys.

The **MMS-3** is also available with an optional rechargeable battery pack that makes it ideal for survey applications. The user can move the **MMS-3** from location to location to take spot samples and store measurements. When fully charged, the battery pack provides eight hours of continuous operation.

The BASEEFA-approved electronics unit is available in rack mount, portable bench mount, and panel mount versions. The electronics unit is also available in NEMA-4X weatherproof and NEMA-7 explosion-proof housings, but these packages are not BASEEFA approved.

IMPORTANT: *Only the **MMS-3**'s that have serial numbers 2001 and above are intrinsically safe.*

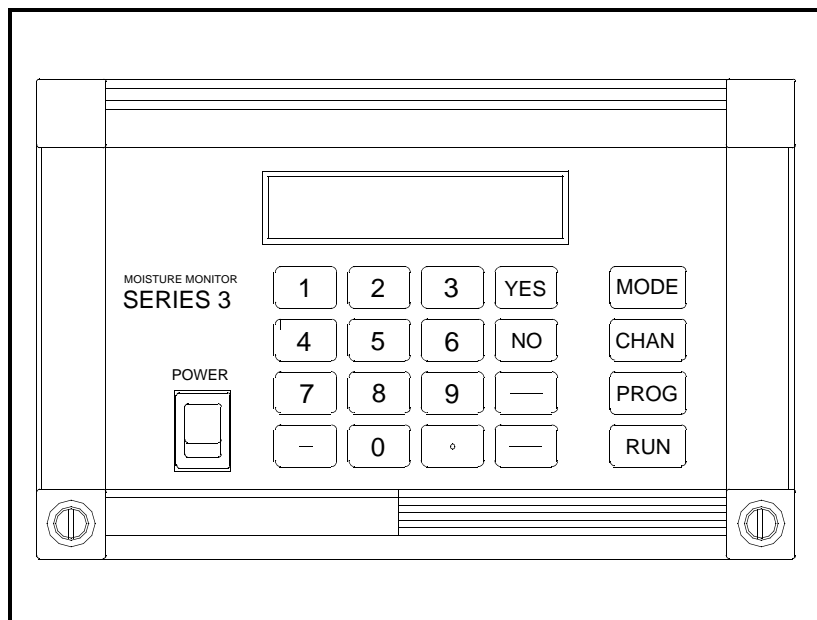


Figure 1-1: Moisture Monitor MMS-3

Probes

Probes are the part of the system that come into contact with the process flow. The **MMS-3** uses various types of probes to fit the needs of different applications.

The term “probe” includes devices such as moisture sensors, pressure transducers, and oxygen cells. Although users can supply their own probes for certain measurements, GE Sensing provides the following standard probes to make moisture, temperature, pressure, and oxygen measurements:

- Moisture (M) Series - moisture and temperature (in gases and liquids)
- Three Function (TF) Series - moisture, temperature, and pressure (in gases and liquids)
- Delta-F Cells - oxygen measurement (in gases).

The most commonly used probes are discussed in more detail below.

M Series and TF Moisture Probes

The M Series and TF Series probes are very similar. Both probes use GE aluminum oxide sensors to measure moisture, and thermistors to measure temperature (the thermistor is optional). The TF Series, however, has an optional built-in strain-gage-type pressure transducer. The sensor assemblies are secured to a probe mount and are usually protected with a sintered stainless-steel shield (TF-9 probes typically do not have a shield). Other types of shields are available. See Figure 1-2 below and Figure 1-3 on page 1-4.

When using an M Series probe, a separate pressure transmitter is required if in-line pressure measurement is needed. The **MMS-3** can use any pressure transmitter with a 0/4 to 20-mA and/or a 0 to 2-V output. Alternatively, the user can enter fixed values for temperature and pressure into the **MMS-3** memory if the process conditions are constant.

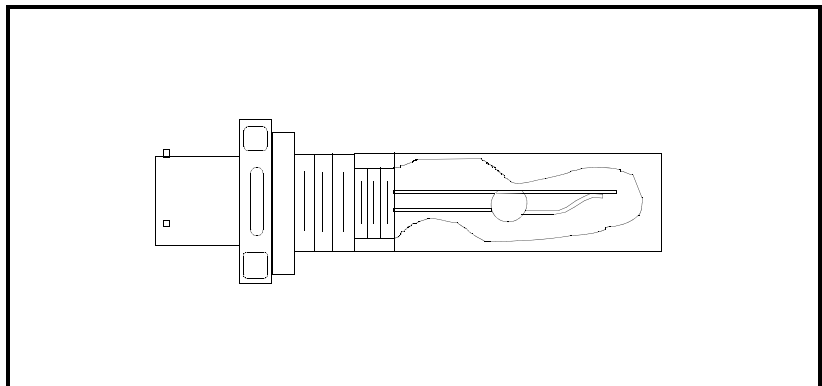


Figure 1-2: M Series Probe

M Series and TF Moisture Probes (cont.)

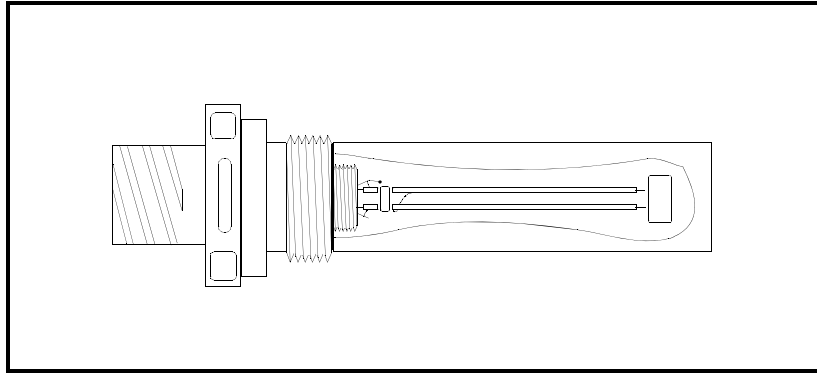


Figure 1-3: TF Series Probe

Although the M and TF Series probes may be installed directly into the process line, they are usually inserted into a sample system. The sample system protects the probes and enables the user to easily remove the probes for calibrating, servicing, and cleaning. Sample systems also control the flow of the process stream so that it is within the specifications of the measurement probe or cell.

The M and TF Series probes, when operated with a BASEEFA-approved **MMS-3**, are intrinsically safe (see Chapter 3, *Specifications*, in the *Startup Guide*, for BASEEFA certification numbers) and are designed to meet requirements of IEC/CENELEC zone 0 areas.

The M and TF Series probes measure moisture content in a standard range from -110°C to 20°C (-166°F to 68°F) dew/frost point temperature, and optionally from -110°C to 60°C (-166°F to 140°F). Both probes optionally measure temperature in a range of -30°C to 70°C (-22°F to 158°F). The TF probe optionally measures pressure from 30 to 300, 50 to 500, 100 to 1000, 300 to 3000, and 500 to 5000 psig.

Pressure Transmitter

In addition to the M Series probe, a separate pressure transmitter may be needed for on-line pressure measurement. Pressure measurement is a necessary input for conversion to certain moisture parameters, such as parts per million by volume water vapor in a gas. The **MMS-3** can use any pressure transmitter with a 0/4 to 20 mA or 0 to 2 V output. Additionally, constant temperature and pressure can be programmed into the **MMS-3** if these process conditions are constant.

Temperature measurement is a necessary input for conversion to certain moisture parameters, such as parts per million by weight water vapor dissolved in a liquid. It is also necessary so maximum temperature/pressure conditions are not exceeded.

Delta F Oxygen Cell

The **MMS-3** standard oxygen measurement probe is the Delta-F Cell. Overall oxygen content range measured using this cell is from 0 to 25%. You may choose from seven standard oxygen ranges. The lowest standard range is 0 to 1/10/100 ppm; the highest standard range is 0 to 25% oxygen. An ultra-low-range sensor that covers 0-500 ppb_v and is sensitive to less than 5 ppb is also available. The **MMS-3** can also accept oxygen inputs from other GE Sensing oxygen sensors using the auxiliary inputs.

If your application has a high concentration of acid-forming components, GE Sensing supplies a STAB-EL option for the Delta F Cell. The STAB-EL option is specially designed to effectively neutralize these components from the sample gas stream.

The Delta F Cell is available in a general purpose model with both a top and bottom drain, or only a top drain as shown in Figure 1-4 below. The Delta F Cell is usually installed in its own sample system. The Delta F Cell is optionally available with VCR[®] fittings, mounted in a NEMA-4X enclosure for weatherproof corrosion resistant applications, or mounted in a NEMA-7 enclosure for hazardous areas.

The Delta F Cell is BASEEFA-approved, and when connected to a BASEEFA-approved **MMS-3**, provides certified intrinsic safety. See Chapter 3 of the *Startup Guide, Specifications*, for certification numbers.

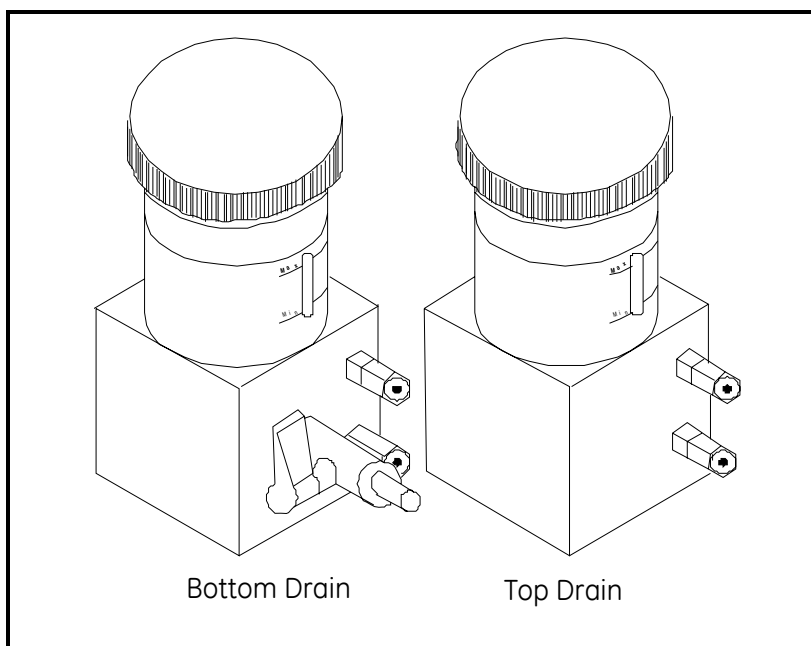


Figure 1-4: Bottom and Top Drain Delta F Oxygen Cells

Cabling

Each probe requires an interconnecting cable. Cables differ depending on the probe. The various cables are discussed below under the appropriate probe type. All of the cable assemblies can be ordered from GE Sensing.

IMPORTANT: *See the Calibration Data Sheets, shipped with the probes, to connect the probes to their corresponding channels. If a probe is connected to the wrong channel, the meter will display incorrect data.*

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

M Series and TF Series Probes

The M and TF Series Probes are connected to the analyzer with a special GE Sensing shielded cable. Probes can be located up to 600 m (2000 ft) from the **MMS-3** (consult GE Sensing for distances up to 1,200 m). To measure pressure with a TF Probe, the maximum cable length is approximately 152 m (500 ft). Small electrical offsets, especially with longer cables, are possible and should be corrected as described in *Performing an MH Calibration Test/Adjustment*, in Chapter 1 of the *Service Manual*.

Delta F Oxygen Cell

The standard Delta F Oxygen Cells are connected to the analyzer with a four-wire shielded cable (22 AWG). Oxygen cells with a range from 0 to 1/10/100 ppm_v or 0 to 0.5/5/50 ppm_v can be located up to 15 m (50 ft) away from the analyzer. All other oxygen cells can be located up to 91 m (300 ft) away. Consult GE Sensing for longer cable lengths.

Pressure Sensors

The **MMS-3** accepts either pressure transducers or pressure transmitters. Most pressure transducers can be connected with a standard four-wire shielded cable. Most pressure transmitters are connected using either a two or four-wire non-shielded cable and can be either loop- or self-powered.

RS232 Communications Port

A personal computer or serial printer can be connected to the **MMS-3** RS232 communications port using a standard serial cable. The **MMS-3** has a special switch that enables you to configure the unit as a Data Terminal Equipment (DTE) or a Data Communications Equipment (DCE) device. (See Chapter 1 in the *Service Manual* for details on DTE/DCE configuration.)

User Program

The **MMS-3** has a user program that is accessed and controlled by its keypad and the four function keys. The user program enables the user to enter the necessary probe data, set up the LCD screen, and control the operational features of the **MMS-3**. The **MMS-3** stores this in battery-backed RAM for up to five years, even when power is off.

The **MMS-3** user program consists of the following 12 main menus:

- **SYSTEM** - This menu enables the user to enter calibration and configurations data.
- **AUTOCAL** - To compensate for any drift in the electronics, the user can program the **MMS-3** to calibrate itself automatically at pre-selected intervals.
- **USER** - This menu is used to enter a saturation constant which the **MMS-3** requires to measure ppm_w in liquids. If applicable, this menu is also used to select the Enhanced Response option.
- **LOGGER** - In this menu the user can (1) program the **MMS-3** to log data at pre-selected time intervals, and (2) access the logged data for viewing.
- **TEST** - This menu allows the user to test the alarm relays and the recorder outputs.
- **CONTRAST** - In this menu the user can adjust the contrast of the display screen to adapt to lighting conditions.
- **BACKLIGHT** - To maintain the life of the LCD backlight, the user can program the electronics unit to turn the backlight off automatically after a predetermined time period.
- **CLOCK** - This menu enables the user to set and/or view the clock and calendar.
- **PORT** - In this menu, the user can select the baud rate, report format and interval for transmitting measurements and logged data over the RS232 communications port.
- **ALARMS** - The **MMS-3** can be equipped with two optional alarm relays (high and low) for each channel. The user can set up both alarms for any of the available measurement modes and units.
- **RECORDERS** - The **MMS-3** has two recorder outputs (A and B) for each channel. The user must set up the output ranges for each recorder and each channel.
- **SysInfo** - This menu supplies basic information on the serial number, program, run time and boot device for a user's particular **MMS-3**.

Chapter 2

Basic Programming

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Startup Procedure

Sensor configuration and system calibration data for your **MMS-3** are entered at the factory. After you unpack the unit, use the sections that follow to verify that your system is working properly and set up the screen to display the desired measurements.

Powering Up

The **MMS-3** has a universal power supply that automatically adjusts to line voltages from 95 to 260 VAC, and a portable battery pack (optional). After making electrical connections as described in Chapter 1 of the *Startup Guide*, press the [ON] switch to power up the **MMS-3**.

IMPORTANT: *For compliance with the EU's Low Voltage Directive (IEC 1010), this unit requires an external power disconnect device such as a switch or circuit breaker. The disconnect device must be marked as such, clearly visible, directly accessible, and located within 1.8 m (6 ft) of the **MMS-3**. The power line is the main disconnect device.*

Caution!

Do not operate the Delta F Oxygen Cell for extended periods of time at oxygen concentrations that are over range. Trace and low percent range sensors may be damaged if exposed to high levels of oxygen, such as air, for long periods (>1 hour) while the **MMS-3** is on. If exposure is unavoidable, either disconnect the oxygen cell from the **MMS-3** or equip the sample system with a valve that allows the cell to be switched to purge gas.

The **MMS-3** normally shows a series of messages that indicate it is functioning normally, and then begins displaying data.

Using the Keypad and Passcode

Use the following sections to become familiar with the key functions and discover the passcode number you will need to access the user program.

Key Functions

The function keys to the right of the keypad are used in the following manner:

- [MODE] - modifies or selects the measurement mode to display.
- [CHAN] - toggles between channels (only works with units that have two channels installed).
- [PROG] - accesses the user program.
- [RUN] - exits the Modify Display Mode or the user program (except during numeric entry) and returns to displaying measurements.

The keypad below the **MMS-3** screen consists of 16 keys (including the [.] and [-] symbols), two arrow keys, and two response keys, ([YES] and [NO]). The numeric keys are for numeric entry only; however, the arrow and response keys have more than one function. The arrow keys perform three functions:

- arrow keys - scroll through the screen selections by moving the brackets forward or backward to the desired location.
- left arrow key - moves backward and erases during numeric entry.
- right arrow key - moves the cursor to the desired location during numeric entry and accepts a change at the present location.

The response keys perform three functions:

- [YES] or [NO] - respond to questions and/or exit a screen.
- [YES] - confirms an entry or retrieves a previous number after you erase it.
- [NO] - moves backward through the menu.

IMPORTANT: *After pressing a key, wait for the unit to perform the desired function before executing another key function.*

Passcode

To enter the user program you must enter a **passcode**. The passcode prevents unauthorized users from changing data. When entering the user program, the **MMS-3** prompts for the passcode. Refer to the end of this chapter for your default passcode.

Displaying Measurements

The **MMS-3** begins displaying measurements immediately after power-up. It provides two lines in order to display measurements. You may select the measurement mode for each line as described in the procedure below.

Since the display has a limited amount of space, the **MMS-3** uses abbreviations to represent the displayed measurement mode and units as shown in Table 2-3 on page 2-5.

Press the [MODE] key to enter the Modify DSP Mode.

| |
|--------------------------------------|
| Display Page: 1 Press YES to Edit |
|--------------------------------------|

The **MMS-3** can display six pages of measurements, each showing two different parameters. Use the numeric keys to enter the desired page and press [YES].

| | |
|-----------------|----|
| Modify DSP Mode | P1 |
| LINE1 [LINE2] | |

Use the arrow keys to move the brackets to the desired line you want to edit and press [YES].

| | |
|-----------------|----|
| Line 2 DSP Mode | P1 |
| [CH 1] CH 2 | |

Use the arrow keys to move the brackets to the desired channel you want to display and press [YES].

| | |
|-----------------|----|
| Select DSP Mode | P1 |
| ◀[H] T P Aux1▶ | |

Use the arrow key to move the brackets to the measurement mode and press [YES]. See Table 2-1 on page 2-4 for a list of the available measurement modes.

Displaying Measurements (cont.)

Table 2-1: Measurement Modes

| Display Abbreviation | Measurement Mode |
|---|------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| AUX1 | Auxiliary 1 |
| AUX2 | Auxiliary 2 |
| USER* | User Function |
| VREF | Volt Reference |
| GND | Signal Ground |
| *User functions are available only through PanaView software. For more information, refer to Chapter 4. | |

When selecting a measurement mode, please remember that some measurement modes require multiple inputs. For example, to display ppm_v , you need a moisture and pressure input. Table 2-2 below shows a list of measurement modes that require multiple inputs and what you need to display them. If the **MMS-3** displays “No Data,” you may have to reconfigure the channel. Refer to *Reconfiguring a Channel for a New Sensor* on page 3-35.

Table 2-2: Measurement Modes and Required Inputs

| To measure: | You need the following inputs: |
|--------------------------|--|
| RH | Temperature and moisture |
| PPM_v | Moisture and pressure |
| PPM_w | Moisture, temperature and saturation constant data |
| PPB_v | Moisture and pressure |
| MCF/IG | Moisture and pressure |
| MCF/NG | Moisture and pressure |
| PPM_v/NG | Moisture and pressure |

| | |
|-------------------|----|
| Select HYGRO Unit | L1 |
| [DP/°C] DP/°F ► | |

Use the arrow keys to move the brackets to the measurement units and press [YES].

Repeat this procedure to set up the other line. When you are done, press [RUN].

Table 2-3: Measurement Modes and Units for the MMS-3

| Selected Meas. Mode | Description of Units | Displayed Meas. Mode | Displayed Units |
|--|---|----------------------|-----------------|
| Oxygen | % = Percent Oxygen <i>default</i> | O | % |
| | ppm _v = Parts Per Million by volume | O | PPMv |
| | ppb _v = Parts Per Billion by volume | O | PPBv |
| | μA = Microamps (Diagnostic Mode) | O | μA |
| | DVM = Digital Voltmeter (Diagnostic Mode) | O | VDC |
| Hygrometry | °C = Dew/Frost Point <i>default</i> | DP | °C |
| | °F = Dew/Frost Point °F | DP | °F |
| | K = Dew/Frost Point K (Kelvin) | DP | K |
| | R.H. = Relative Humidity | H | % |
| | H/ppMv = Parts per Million of Water by Volume | H | PPMv |
| | H/ppMw = Parts per Million of Water by Weight (for liquids only) | H | PPMw |
| | H/ppBv = Parts per Billion of Water by Volume | H | PPBv |
| | MCF/IG = Pounds of Water per Million Std. Cubic Feet in Ideal Gas | H | llbs |
| | MCF/NG = Pounds of Water per Million Std. Cubic Feet in Natural Gas | H | NIbs |
| | ppMv/NG = Parts Per Million by Volume in Natural Gas | H | NPMv |
| | Pw/mmHg = Vapor Pressure of Water in mmHg | H | mmHg |
| | Pw/Pa = Vapor Pressure of Water in Pascals | H | Pa |
| | MH = MH* (Diagnostic Mode) | H | MH |
| | DVM = Digital Voltmeter (Diagnostic Mode) | H | VDC |
| Temperature | °C = Degrees Celsius <i>default</i> | T | °C |
| | °F = Degrees Fahrenheit | T | °F |
| | K = Kelvin | T | K |
| | DVM = Digital Voltmeter (Diagnostic Mode) | T | VDC |
| Pressure | PSIg = Pounds per Square Inch Gauge <i>default</i> | P | PSIg |
| | Bars = Bars | P | Bars |
| | mbs = Millibars | P | mbs |
| | mm/Hg = Millimeters of Mercury | P | mmHg |
| | Pas = Pascal | P | Pg |
| | kPas = KiloPascal | P | KPg |
| | pMV = Pressure in millivolts | P | mV |
| | DVM = Digital Voltmeter (Diagnostic Mode) | P | VDC |
| Auxiliary 1 | VDC | X1 | VDC |
| | mA | X1 | mA |
| | Func | X1 | none |
| Auxiliary 2 | VDC | X2 | mV |
| | mA | X2 | mA |
| | Func | X2 | none |
| Volt Reference | VREF = Volts <i>default</i> (Diagnostic Mode) | VR | VDC |
| Signal Ground | GND = Volts <i>default</i> (Diagnostic Mode) | | |
| *The MH value is the moisture sensor's response value and is the value which is recorded during calibration. | | | |

Setting the Backlight Timer

The **MMS-3** has a backlight timer which is provided with battery-powered units to preserve battery power and prolong the life of the LCD.

Press the [PROG] key to enter the user program.

| |
|----------------------|
| Enter Passcode: XXXX |
|----------------------|

Enter the passcode.

Note: *If you have already entered the user program, refer to the menu maps at the end of Chapter 3 to navigate to the Backlight Menu.*

| | |
|------------------|---|
| Programming Menu | 1 |
| ◀[BACKLIGHT]▶ | |

Use the arrow keys to move the brackets to BACKLIGHT and press [YES].

| | |
|-------------------|---|
| Backlight On Time | 1 |
| 00:05 (HH:MM) | |

Enter the desired time interval and press [YES]. If you do not want to use the backlight, enter 0 (zero).

You may now do one of the following:

- Refer to another section and perform a different procedure. Refer to the menu maps at the end of Chapter 3 to navigate through the user program.
- Exit by pressing the [RUN] key.

Viewing or Setting the Clock and Calendar

Use the steps below to view or set the clock and calendar.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, refer to the menu maps at the end of Chapter 3 to navigate to the CLOCK Menu.*

Programming Menu 1
◀ BACKLIGHT [CLK] ▶

Use the arrow keys to move the brackets to CLOCK and press [YES].

Clock Menu 1
[SHOW] SET

Use the arrow keys to move the brackets to the desired selection and press [YES].

If you select SHOW:

Clock Menu 1
12:14 06/01/1997

The time and date appear. Press [YES] to return to the Programming Menu.

If you select SET:

Use the arrow keys to move the cursor, and then enter the correct information. The cursor automatically jumps to the next position.

When you are done making changes, press [YES] to confirm your entry. Then press [NO] to leave the CLOCK Menu and return to the Programming Menu.

You may now do one of the following:

- Refer to another section and perform a different procedure. Refer to the menu maps at the end of Chapter 3 to navigate through the user program.
- Exit by pressing the [RUN] key.

Accessing System Information

If you need to confirm the system information on your particular **MMS-3** unit, the user program includes a menu, SysInfo, that supplies the serial number, run time and boot device for your meter.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, refer to the menu maps at the end of Chapter 3 to navigate to the SysInfo Menu.*

Programming Menu 1
◀ [SysInfo]

Use the arrow keys to move the brackets to SysInfo and press [YES].

System Information
[PROGRAM] UpTime▶

Use the arrow keys to move the brackets to the desired selection and press [YES].

If you select PROGRAM:

Code:MMS3.STD.003C
Mfg. 9/21/00

The program code and manufacturing date appear, followed by the serial number and PCI number. The program then returns to the SysInfo menu.

If you select UpTime:

Up Time; 0 Days
5 Hrs 36 Min

The screen briefly displays the time the **MMS-3** has run since it was turned on, and then returns to the SysInfo menu.

If you select BootDevice:

Boot device is
Flash

The screen briefly displays the type of boot device installed, and then returns to the SysInfo menu.

**Accessing System
Information (cont.)**

You may now do one of the following:

- Refer to another section and perform a different procedure. Refer to the menu maps at the end of Chapter 3 to navigate through the user program.
- Exit by pressing the [RUN] key.

Your passcode is 2719.

Please remove this page and put it in a safe place for future reference.

Chapter 3

Advanced Programming

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Introduction

Now that the **MMS-3** is running and the screen is set up, you may want to use the other operational features included in this chapter (see the previous page for the list and locations of those features).

Setting Up the Alarms

The **MMS-3** can be equipped with an optional high and low alarm relay for each channel.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-3 on page 3-49 to navigate to the Alarms Menu.*

Programming Menu 1
◀ [ALARMS] ▶

Use the arrow keys to move the brackets to ALARMS and press [YES].

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Select Alarm 1
[A] B

Use the arrow keys to move the brackets to the desired alarm (A or B) and press [YES].

The **MMS-3** briefly flashes a message, “Relay Status -- Reset,” and then displays the next prompt.

Select Mode 1
O [H] T P Aux1▶

Use the arrow keys to move to the desired measurement mode and press [YES]. See Table 3-1 on page 3-2 for a list of available measurement modes.

Setting Up the Alarms (cont.)

Table 3-1: Measurement Modes

| Display Abbreviation | Measurement Mode |
|--|------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| Aux 1 | Auxiliary 1 |
| Aux 2 | Auxiliary 2 |
| User* | User Function |
| Vref | Volt Reference |
| Gnd | Signal Ground |
| *User functions are available only through PanaView software (see <i>Programming User Functions</i> in Chapter 4). | |

| | |
|------------------|---|
| Select Unit | 1 |
| [DP/°C] DP/ °F ► | |

Use arrow keys to move the brackets to the desired units and press [YES].

Note: *The number of measurement choices and the units of measurement vary depending on the measurement mode selected.*

| | |
|------------------|---|
| Select Trip Type | 1 |
| [Above] Below | |

Use the arrow keys to move the brackets to the desired trip type (whether you want the alarm to trip above or below the programmed value) and press [YES].

| | | |
|------------|--------|---|
| A Setpoint | DeadBD | 1 |
| +0.0 | +0.0 | |

Use the numeric keys to enter the setpoint (the value above or below which you want the alarm to trip) and press [YES] to confirm the entry. If you wish to enter a deadband value (explained on the next page), press the right arrow key to reach the value, use the numeric keys to enter the value, and press [YES].

Setting Up the Alarms (cont.)

The deadband allows users to set a programmable range of (normally small) values beyond the setpoint, so that the **MMS-3** will not trigger an alarm unless the measured value goes outside the deadband range. On a High (Above) alarm, the alarm will trip if the measurement is greater than or equal to the setpoint. It will not RESET until the measurement is less than the setpoint *minus* the deadband. However, on a Low (Below) alarm, the alarm will trip if the measurement is less than or equal to the setpoint. It will not RESET until the measurement is greater than the setpoint *plus* the deadband.

You may now do one of the following:

- Set up the alarms for the other channel (page 3-1). Begin by checking the channel number.
- Refer to another section and perform a different procedure. Refer to the menu maps at the end of this chapter to navigate through the user program.
- Exit by pressing the [RUN] key.

Setting Up the Recorders The MMS-3 has two recorder outputs (A and B) for each channel.

IMPORTANT: *Switch Blocks must be set to the appropriate positions for output ranges (see Setting the Switch Blocks in Chapter 1 of the Service Manual).*

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-3 on page 3-49 to navigate to the Recorder Menu.*

Programming Menu 1
◀[RECORDERS]▶

Use the arrow keys to move the brackets to RECORDER and press [YES].

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Select Recorders 1
[A] B

Use the arrow keys to move the brackets to the desired recorder and press [YES].

Select RCD Range 1
[0-20mA] 4-20mA ▶

Use the arrow keys to move the brackets to the desired recorder range and press [YES].

Select Mode 1
O [H] T P Aux1▶

Use the arrow keys to move to the desired measurement mode and press [YES]. See Table 3-2 on page 3-5 for a list of available measurement modes.

Setting Up Recorders (cont.)

Table 3-2: Measurement Modes

| Display Abbreviation | Measurement Mode |
|--|------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| Aux 1 | Auxiliary 1 |
| Aux 2 | Auxiliary 2 |
| User* | User Function |
| Vref | Volt Reference |
| Gnd | Signal Ground |
| *User functions are available only through PanaView software (see <i>Programming User Functions</i> in Chapter 4). | |

| | |
|----------------|---|
| Select Units | 1 |
| [DP/°C] DP/°F▶ | |

Use arrow keys to move the brackets to the desired units and press [YES].

Note: *The number of measurement choices and the units of measurement vary depending on the measurement mode selected.*

| | |
|------------------|---|
| Set RCD-A OUTPUT | 1 |
| [ZERO] SPAN | |

Use the arrow keys to move the brackets to ZERO and press [YES].

| | |
|------------------|---|
| RCD-A Zero Setup | 1 |
| 20.0 | |

Enter the zero value and press [YES]. Then press [NO] to return to the previous screen.

Repeat the two final steps to enter the span value.

You may now do one of the following:

- Set up another recorder by pressing [NO] until you return to the *Select Recorder* step, and then begin with the recorder selection step (refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 for a menu map of the user program).
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Setting Up the Communications Port

The **MMS-3** can transmit measurements and logged data to a serial printer or personal computer using the RS232 communications port. You can select the baud rate, report format and interval as described below. Other serial port settings are set and cannot be changed:

- 8 bit word length
- no parity
- 1 stop bit
- flow control is not supported.

IMPORTANT: *For proper operation, make sure the RS232 switch is set correctly (see Connecting a Personal Computer or Printer in Chapter 1 of the Service Manual).*

Press the [PROG] key to enter the user program.

Note: *If you have already entered the user program, see Figure 3-3 on page 3-49 to navigate to the Port Menu.*

Enter Passcode: XXXX

Enter the passcode.

Programming Menu 1
◀ [PORT] ALARMS ▶

Use the arrow keys to move the brackets to PORT and press [YES].

Port Menu 1
[BAUD] FORMAT

Use the arrow keys to move the brackets to one of the selections and press [YES].

IMPORTANT: *To ensure the communications port is set up properly, you should check all the selections in the Printer Port Menu.*

If you selected BAUD:

Select Baud Rate 1
◀ 19200 [9600] ▶

Use the arrow keys to select the desired baud rate and press [YES].

Note: *If you are using PanaView™ software, set the baud rate to 19,200.*

Setting Up the Communications Port (cont.)

If you selected FORMAT:

Refer to page 3-23 for a sample output and description of report data.

| |
|-----------------------------|
| Format Menu |
| [PRINTER] ► PANALINK MODBUS |

Use the arrow keys to select the desired report format (PRINTER, PANALINK or MODBUS) and press [YES].

If you selected PRINTER:

| | |
|----------------|---|
| Enter Interval | 1 |
| 90:00 (MM:SS.) | |

Enter the interval (0 to 90 minutes) at which you want the **MMS-3** to transmit data and press [YES].

Note: Enter 0 (zero) as the interval to print at the unit's update rate.

If you selected PANALINK:

| | |
|---------------|---|
| Enter Node ID | 1 |
| 16 | |

Unless you are instructed to change the Node ID number by the factory, please leave the number at the default ID of 16.

Note: *If you selected MODBUS, refer to Setting Up MODBUS Communications on page 3-8.*

You may now do one of the following:

- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Setting Up Modbus Communications

The **MMS-3** can transmit stored data and displayed readings to a remote ANSI terminal or a personal computer by using an external RS232-to-RS485 converter. Any **MMS-3** with software version MMS3.STD.003.J and above has been modified to report fundamental hygrometry data using MODBUS. The meter can transmit the ten essential measurements using the MODBUS Read Holding Register function.

To program the **MMS-3**:

Press the [PROG] key to enter the user program.

Note: *If you have already entered the user program, see Figure 3-3 on page 3-49 to navigate to the Port Menu.*

| |
|----------------------|
| Enter Passcode: XXXX |
|----------------------|

Enter the passcode.

| | |
|-------------------|---|
| Programming Menu | 1 |
| ◀ [PORT] ALARMS ▶ | |

Use the arrow keys to move the brackets to PORT and press [YES].

| | |
|---------------|---|
| Port Menu | 1 |
| BAUD [FORMAT] | |

Use the arrow keys to move the brackets to FORMAT and press [YES].

| |
|---------------------------|
| Format Menu |
| PRINTER PANALINK [MODBUS] |

Use the arrow keys to select MODBUS and press [YES].

Note: *The MMS-3 will display the prompt "Enter Node ID" for selection of a server ("slave") address.:*

| | |
|---------------|---|
| Enter Node ID | 1 |
| 1 | |

Enter a number between 1 and 247.

Press [NO] to exit the Node ID menu and again to exit the FORMAT menu.

The FORMAT and BAUD options appear on the same level of the programming hierarchy, but the communication mode, MODBUS, must be set before selection of its transmission speed.

MODBUS Register Map

Addresses are tabulated in Table 3-3 below in hexadecimal notation. Register numbers, in decimal, are equal to the address plus one.

Use the most-significant word (MSW) as the register number for measurement values, which are IEEE 754 floating-point representations (32-bits) transmitted using a pair of 16-bit registers.

Error codes are integers contained in a single register (Table 3-4 on page 3-11).

Table 3-3: MODBUS Register Map

| Register | Address | Measurement | Data |
|--------------------|---------|--------------------------------|---------|
| Oxygen | | | |
| 1 | 0x0000 | Chan 1, Oxygen, % | MSW |
| 2 | 0x0001 | Chan 1, Oxygen, % | LSW |
| 3 | 0x0002 | Chan 1, Oxygen % Error Code | 0-32767 |
| 4 | 0x0003 | Chan 2, Oxygen, % | MSW |
| 5 | 0x0004 | Chan 2, Oxygen, % | LSW |
| 6 | 0x0005 | Chan 2, Oxygen % Error Code | 0-32767 |
| | | | |
| 25 | 0x0018 | Chan 1, Oxygen, PPM | MSW |
| 26 | 0x0019 | Chan 1, Oxygen, PPM | LSW |
| 27 | 0x001A | Chan 1, Oxygen PPM Error Code | 0-32767 |
| 28 | 0x001B | Chan 2, Oxygen, PPM | MSW |
| 29 | 0x001C | Chan 2, Oxygen, PPM | LSW |
| 30 | 0x001D | Chan 2, Oxygen PPM Error Code | 0-32767 |
| Moisture | | | |
| 1025 | 0x0400 | Chan 1, Dew Point, °C | MSW |
| 1026 | 0x0401 | Chan 1, Dew Point, °C | LSW |
| 1027 | 0x0402 | Chan 1, Dew Point Error Code | 0-32767 |
| 1028 | 0x0403 | Chan 2, Dew Point, °C | MSW |
| 1029 | 0x0404 | Chan 2, Dew Point, °C | LSW |
| 1030 | 0x0405 | Chan 2, Dew Point Error Code | 0-32767 |
| Temperature | | | |
| 2049 | 0x0800 | Chan 1, Temperature, °C | MSW |
| 2050 | 0x0801 | Chan 1, Temperature, °C | LSW |
| 2051 | 0x0802 | Chan 1, Temperature Error Code | 0-32767 |
| 2052 | 0x0803 | Chan 2, Temperature, °C | MSW |
| 2053 | 0x0804 | Chan 2, Temperature, °C | LSW |
| 2054 | 0x0805 | Chan 2, Temperature Error Code | 0-32767 |

Table 3-3: MODBUS Register Map

| Register | Address | Measurement | Data |
|------------------------|---------|----------------------------------|---------|
| Pressure | | | |
| 3073 | 0x0C00 | Chan 1, Pressure, PSIg | MSW |
| 3074 | 0x0C01 | Chan 1, Pressure, PSIg | LSW |
| 3075 | 0x0C02 | Chan 1, Pressure PSIg Error Code | 0-32767 |
| 3076 | 0x0C03 | Chan 2, Pressure, PSIg | MSW |
| 3077 | 0x0C04 | Chan 2, Pressure, PSIg | LSW |
| 3078 | 0x0C05 | Chan 2, Pressure PSIg Error Code | 0-32767 |
| | | | |
| 3193 | 0x0C78 | Chan 1, Pressure, kPa | MSW |
| 3194 | 0x0C79 | Chan 1, Pressure, kPa | LSW |
| 3195 | 0x0C7A | Chan 1, Pressure kPa Error Code | 0-32767 |
| 3196 | 0x0C7B | Chan 2, Pressure, kPa | MSW |
| 3197 | 0x0C7C | Chan 2, Pressure, kPa | LSW |
| 3198 | 0x0C7D | Chan 2, Pressure kPa Error Code | 0-32767 |
| Auxiliary Input | | | |
| 4097 | 0x1000 | Chan 1, Aux1, VDC | MSW |
| 4098 | 0x1001 | Chan 1, Aux1, VDC | LSW |
| 4099 | 0x1002 | Chan 1, Aux1 VDC Error Code | 0-32767 |
| 4100 | 0x1003 | Chan 2, Aux1, VDC | MSW |
| 4101 | 0x1004 | Chan 2, Aux1, VDC | LSW |
| 4102 | 0x1005 | Chan 2, Aux1 VDC Error Code | 0-32767 |
| | | | |
| 4121 | 0x1018 | Chan 1, Aux1, mA | MSW |
| 4122 | 0x1019 | Chan 1, Aux1, mA | LSW |
| 4123 | 0x101A | Chan 1, Aux1 mA Error Code | 0-32767 |
| 4124 | 0x101B | Chan 2, Aux1, mA | MSW |
| 4125 | 0x101C | Chan 2, Aux1, mA | LSW |
| 4126 | 0x101D | Chan 2, Aux1 mA Error Code | 0-32767 |
| | | | |
| 5121 | 0x1400 | Chan 1, Aux2, VDC | MSW |
| 5122 | 0x1401 | Chan 1, Aux2, VDC | LSW |
| 5123 | 0x1402 | Chan 1, Aux2 VDC Error Code | 0-32767 |
| 5124 | 0x1403 | Chan 2, Aux2, VDC | MSW |
| 5125 | 0x1404 | Chan 2, Aux2, VDC | LSW |
| 5126 | 0x1405 | Chan 2, Aux2 VDC Error Code | 0-32767 |

Table 3-3: MODBUS Register Map

| Register | Address | Measurement | Data |
|-------------------------|---------|----------------------------|---------|
| Auxiliary Input (cont.) | | | |
| 5145 | 0x1418 | Chan 1, Aux2, mA | MSW |
| 5146 | 0x1419 | Chan 1, Aux2, mA | LSW |
| 5147 | 0x141A | Chan 1, Aux2 mA Error Code | 0-32767 |
| 5148 | 0x141B | Chan 2, Aux2, mA | MSW |
| 5149 | 0x141C | Chan 2, Aux2, mA | LSW |
| 5150 | 0x141D | Chan 2, Aux2 mA Error Code | 0-32767 |

MMS-3 Error Codes

Table 3-4: Error Codes Displayed by MODBUS

| No. | Error | No. | Error | No. | Error | No. | Error |
|-----|------------------|-----|----------------------|-----|----------------|-----|--------------------------------|
| 0 | No Error | 9 | No Data | 18 | Pressure Fault | 27 | User Div Zero |
| 1 | No Probe | 10 | No Cal | 19 | Aux1 Fault | 28 | User Math |
| 2 | Out of Range | 11 | Unknwn Probe | 20 | Aux2 Fault | 29 | User Missing Term |
| 3 | Over Range | 12 | Aux Fail | 21 | Ref Fault | 30 | User Extra Term |
| 4 | Under Range | 13 | Cal Error | 22 | Gnd Fault | 31 | User Missing Op |
| 5 | Not Available | 14 | No Channel | 23 | ADC Fault | 32 | User Extra Op |
| 6 | No Communication | 15 | O ₂ Fault | 24 | Fluid Low! | 33 | User Too Complex |
| 7 | Error 10 | 16 | Hygro Fault | 25 | User Re Ent | 34 | User Missing Left Parentheses |
| 8 | No Reference | 17 | Temp Fault | 26 | User Invalid | 35 | User Missing Right Parentheses |

Modbus RS485
Connection

The **MMS-3** offers a standard RS232 port. It is necessary to supply an RS232 - RS485 converter for the Modbus functionality.

Depending on the converter, the RS232 from the **MMS-3** is connected to the terminal marked RS232 on the converter. The RS485 output from the converter can be connected directly to the user's DCS system (point to point) or to a multi-drop system

Using Automatic Calibration

The **MMS-3** automatically calibrates itself (Auto-Cal) at user-selectable intervals. Auto-Cal compensates for any drift in the electronics. GE Sensing recommends setting the Auto-Cal interval to eight hours (480 minutes). Set a smaller interval to Auto-Cal more frequently if the **MMS-3** is exposed to extreme temperatures or weather conditions.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-2 on page 3-48 to navigate to the Autocal Menu.*

Programming Menu 1
SYSTEM [AUTOCL]▶

Use the arrow keys to move the brackets to AUTOCL and press [YES].

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Autocal Interval 1
01:00 (HH:MM)

Enter an Auto-Cal interval between 0 and 24 hours and press [YES].

After you exit the user program, the **MMS-3** immediately performs Auto-Cal. The next time Auto-Cal occurs will depend on the length of the time interval set, as shown in the example below.

Example:

The **MMS-3** establishes a fixed schedule, beginning at Midnight, using the interval specified to determine the times of subsequent Auto-Cals. For example, if you enter a 90 minute time interval, Auto-Cal will occur 16 times per day:

$$(1 \text{ day} = 1440 \text{ minutes} \div 90 \text{ minutes} = 16).$$

The fixed schedule will be as follows:

- | | |
|--------------------|-------------------------|
| 1. 1:30 AM | 9. 1:30 PM |
| 2. 3:00 AM | 10. 3:00 PM |
| 3. 4:30 AM | 11. 4:30 PM |
| 4. 6:00 AM | 12. 6:00 PM |
| 5. 7:30 AM | 13. 7:30 PM |
| 6. 9:00 AM | 14. 9:00 PM |
| 7. 10:30 AM | 15. 10:30 PM |
| 8. 12:00 PM (Noon) | 16. 12:00 AM (Midnight) |

Using Automatic Calibration (cont.)

If you set the 90 minute Auto-Cal interval at 6:10 p.m., the next Auto-Cal will occur at 7:30 p.m. (excluding the Auto-Cal performed when first leaving the Autocal Menu).

If you enter a time interval that is not evenly divisible into 1440 minutes (1 day), the **MMS-3** rounds up to the next acceptable interval.

You may now do one of the following:

- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Checking the Battery Status

If your **MMS-3** has the battery pack, you should periodically monitor the amount of charge the battery has left, as described below.

Disconnect the AC power. Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-3 on page 3-49 to navigate to the Test Menu.*

Programming Menu 1
◀[TEST] CONTRAST▶

Use the arrow keys to move the brackets to TEST and press [YES].

Test Menu 1
◀[BATTERY]

Use the arrow keys to move the brackets to BATTERY and press [YES].

Battery Test
[STATUS] RdChgTime

Use the arrow keys to move the brackets to STATUS and press [YES].

Battery Status (v)
XX.XX Press [YES]

The **MMS-3** alternates two displays showing the battery voltage and how much longer the battery will operate (in minutes).

Run Time Left (min)
XXX

Checking the Battery Status (cont.)

When the battery voltage reads:

- 12.0 Volts - the battery is fully charged and will supply approximately 480 minutes (8 hours) of power.
- 11.4 Volts - the **MMS-3** displays the low battery message (refer to *Recharging the Battery Pack* in Chapter 2 of the *Service Manual*).
- 10.9 Volts - the **MMS-3** will shut down (refer to *Recharging the Battery Pack* in Chapter 2 of the *Service Manual*).

Note: *Continuous use of the backlight and alarms shortens the battery life by 1-2 hours from the estimated battery life displayed on the screen.*

Press [YES] to proceed.

You may now do one of the following:

- Recharge the battery as described in *Recharging the Battery Pack* in Chapter 2 of the *Service Manual*.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Setting Up the Data Logger

The **MMS-3** has a data logging feature that enables you to internally store and view data. Data is logged at user-selected time intervals and is stored in the unit's SRAM memory or in an optional PCMCIA card.

You may choose up to twelve (12) parameters to log at a time. Since a fixed amount of memory is assigned to data logging, the more parameters you select and the more frequent the time interval, the sooner the available memory will be filled. The **MMS-3** has a status screen that lists the number of records, bytes free, bytes used, and the remaining hours and minutes the log will run before running out of memory.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-2 on page 3-48 to navigate to the Logger Menu.*

Programming Menu 1
◀USER [LOGGER]▶

Use the arrow keys to move the brackets to LOGGER and press [YES].

You can do one of the following:

- Indicate how to store logged data, as described in *Storing Logged Data* on page 3-17.
- Select measurements you want to log as described in *Setting Up a Log* on page 3-18.
- View logged data or the status of the log as described in *Viewing Logged Data and Status* on page 3-21.
- Exit by pressing the [RUN] key.

Storing Logged Data

| | |
|---------------------|---|
| Data Logging | 1 |
| [STORAGE] SETUP▶ | |

Use the arrow keys to select STORAGE and press [YES].

| | |
|----------------|---|
| Select Storage | 1 |
| [A] B | |

Use the arrow keys to select A (for internal storage) or B (for a PCMCIA card) and press [YES].

| |
|---------------------|
| # Bytes Free: 65269 |
| # Bytes Used: 839 |

Two displays briefly appear before the program returns to the *Data Logging* menu.

| |
|---------------|
| Records: 78 |
| Rem: 23:46:44 |

You may now do one of the following:

- Set up a log as described in *Setting up a Log* on page 3-18.
- View logged data or the status of the log as described in *Viewing Logged Data and Status* on page 3-21.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Setting up a Log

| | |
|-------------------|---|
| Data Logging | 1 |
| ◀ [SETUP] VIEW | |

Use the arrow keys to select SETUP and press [YES].

| | |
|-----------------|---|
| Create New Log? | 1 |
| Press YES or NO | |

Press [YES] to create a new log, or [NO] to return to the previous screen.

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to log. If not, press the [CHAN] key to select the desired channel.

| | |
|-------------|---|
| Cyclic: | 1 |
| [NO] YES | |

Use the arrow keys to indicate whether or not you want a cyclic (circular) log. Press [YES] to confirm your entry.

| | |
|-------------|---|
| Error Log: | 1 |
| [NO] YES | |

Use the arrow keys to indicate whether or not you want to record errors. Press [YES] to confirm your entry.

| | |
|------------------------|---|
| Start: | 1 |
| 10/03/2000 12:01:14 | |

Use the arrow keys to move from one digit of the starting date and time to another, and use the numeric keys to change an entry. Press [YES] to confirm your entry.

| | |
|------------------------|---|
| End: | 1 |
| 10/03/2000 12:01:14 | |

Use the arrow keys to move from one digit of the end date and time to another, and use the numeric keys to change an entry. Press [YES] to confirm your entry.

| | |
|-----------|---|
| Interval: | 1 |
| 00:05 | |

Use the numeric keys to enter the desired log interval in minutes and seconds (down to 5 sec). Press [YES] to confirm the entry.

| | |
|--------------------|---|
| Enter Log#: (1-12) | 1 |
| 1 | |

Enter the log item number and press [YES].

Setting up a Log (cont.)

| | |
|--------------------|---|
| Sel. DATA LOG Mode | 1 |
| [O] H T P Aux1▶ | |

Use the arrow keys to move to the desired measurement mode and press [YES]. See Table 3-5 below for a list of available measurement modes.

Table 3-5: Measurement Modes

| Display Abbreviation | Measurement Mode |
|--|------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| Aux 1 | Auxiliary 1 |
| Aux 2 | Auxiliary 2 |
| User* | User Function |
| VREF | Volt Reference |
| GND | Signal Ground |
| *User functions are available only through PanaView software (see <i>Programming User Functions</i> in Chapter 4). | |

| | |
|--------------------|---|
| Datalog HYGRO Unit | 1 |
| [DP/°C] DP°F▶ | |

Use arrow keys to move the brackets to the desired units and press [YES].

Note: *The number of measurement choices and the units of measurement vary depending on the measurement mode selected.*

| |
|--------------------|
| Finished (YES/NO)? |
|--------------------|

If you press [NO], the menu returns to the “Enter Log#” prompt. Repeat the preceding steps to select the remaining measurements you want to log (up to 12). When you have finished entering items and parameters, press [YES].

| |
|---------------------|
| Start Logging? |
| Press [YES] or [NO] |

Press [YES] to begin logging, or [NO] to leave the menu without logging.

Setting up a Log (cont.)

You may now do one of the following:

- Indicate how to store logged data, as described in *Storing Logged Data* on page 3-17.
- View logged data or the status of the log as described in *Viewing Logged Data and Status* on page 3-21.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Viewing Logged Data and Status

| | |
|--------------|---|
| Data Logging | 1 |
| SETUP [VIEW] | |

Use the arrow keys to select VIEW and press [YES].

| | |
|---------------|---|
| View Data Log | 1 |
| [STATUS] DATA | |

Use the arrow keys to move the brackets to one of the selections and press [YES].

If you selected STATUS:

| |
|-------------------|
| Storage: Internal |
|-------------------|

The log status will display each of the following screens for two seconds before returning to the *Data Logging* menu.

| |
|---------------------|
| # Bytes Free: 65269 |
| # Bytes Used: 839 |

| |
|---------------|
| Records: 78 |
| Rem: 23:46:44 |

To view data, refer back to the “View Data Log” option above in the *Data Logging* menu. If you are done, skip to page 3-22.

If you selected DATA:

| |
|-----------------|
| Searching . . . |
|-----------------|

The **MMS-3** displays data similar to the following:

| |
|-----------------|
| Log Started at: |
| 10/3/00 14:33 |

| |
|----------------|
| TIME CH1:02%: |
| 14:36:55 ERR01 |

Use the following keys to view data:

- Use the arrow keys to scroll to the desired measurement parameter to view (e.g., temperature, oxygen).
- Use the [1] key to view the next measurement taken at the specified interval (e.g., move from the measurement logged at 17:35 to the measurement logged at 17:36).
- Use the [3] key to scroll to the previous measurement recorded at the specified interval (e.g., move from measurement logged at 4:01 to the measurement logged at 4:00).
- Press [NO] to end viewing data. To view the status, refer back to Step 2. If you are done, proceed to page 3-22.

Viewing Logged Data and
Status (cont.)

You may now do one of the following:

- Indicate how to store logged data, as described in *Storing Logged Data* on page 3-17.
- Set up another log as described in *Setting up a Log* on page 3-18.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Description of a Sample Output

Figure 3-1 below shows a typical data record. Each record displays: message ID, date, time, channel, mode/unit, data, and carriage return.

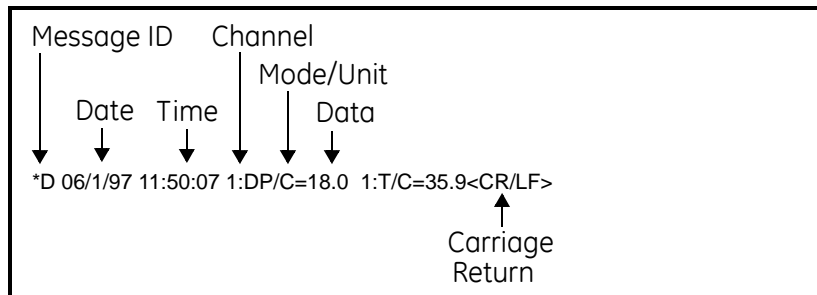


Figure 3-1: Record Sample

Note: *The length of the line depends on how many characters your screen has per line, or the width of the page.*

Message ID

Every record begins with the Message ID that consists of an asterisk (*) and the report type. *D denotes a Display (Matrix) report and *L denotes a Log Report. The Message ID is always followed by one ASCII space.

Date

The date of the report is shown in MM/DD/YY format. The **MMS-3** uses a zero as a column place holder, so the date will always be eight characters long. The date is always followed by one ASCII space.

Time

The time of the report is shown in HH:MM:SS format. Time is in 24-hour format. The **MMS-3** uses a zero as a column place holder, so the time will always be eight characters long. The time is always followed by one ASCII space.

Channel

The channel is a single digit from 1 to 6, and is the channel from which the displayed measurement was read. The channel is always followed by a colon (:).

Mode/Unit

The modes or units are represented by an abbreviation. Refer to Table 3-6 on page 3-24 for abbreviations. The Mode/Unit is always followed by an equals sign (=).

Data

Data is the actual measurement. The number of digits and the position of the decimal point, if any, will vary with the magnitude and type of data (see Table 3-6 on page 3-24 for mode/units number formats). Signed values will contain a leading plus (+) or minus (-). Unsigned values (percent oxygen, for example) have no sign. The data is always followed by two ASCII spaces.

<CR/LF>

Every record is terminated with a carriage return/line feed pair (ASCII 13 and 10 decimal, 0D and 0A hexadecimal).

Table 3-6: Print-Out Symbols and Abbreviations

| Mode/Unit | Number Format | Measurement Mode |
|--------------------|---------------|--|
| Oxygen | | |
| O/% | XXX.X | Oxygen concentration in percent. |
| O/PPMv | XXXX.XX | Oxygen concentration in parts per million. |
| O/uA | ±XXX.XXX | Oxygen cell current in micro amperes. |
| O/VDC | ±X.XXXX | Oxygen circuit voltage in volts DC |
| Moisture | | |
| DP/C | ±XXX.X | Dew point in degrees Celsius. |
| DP/F | ±XXX.X | Dew point in degrees Fahrenheit. |
| DP/K | ±XXX.X | Dew point in Kelvin. |
| H/% | XXX.X | Relative humidity in percent. |
| H/HPMv | XXX.XXX | Parts per million of water by volume. |
| H/HPBv | XXX.XXX | Parts per billion of water by volume. |
| H/ppMw | XXX.XXX | Parts per million of water by weight. |
| H/llbs | X.XXXX | Pounds of water per million standard cubic feet of an ideal gas. |
| H/Nlbs | X.XXXX | Pounds of water per million standard cubic feet of natural gas. |
| H/NPMv | XXX.XXX | Parts per million of water by volume in natural gas. |
| H/MH | X.XXXX | GE Sensing moisture calibration unit for M and TF Series probes. |
| H/VDC | ±X.XXXX | Moisture circuit voltage in volts DC. |
| Temperature | | |
| T/C | ±XXX.X | Temperature in degrees Celsius. |
| T/F | ±XXX.X | Temperature in degrees Fahrenheit. |
| T/K | ±XXX.X | Temperature in Kelvin. |
| T/VDC | ±X.XXXX | Temperature circuit voltage in volts DC. |
| Pressure | | |
| P/PSIg | ±X.XXX | Pressure in pounds per square inch gage. |
| P/Bars | X.XXXX | Pressure in bars absolute. |
| P/mbs | XXXX.X | Pressure in millibars. |
| P/mmHg | XXX.XXX | Pressure in millimeters of mercury absolute. |
| P/Pg | XXXXX | Pressure in Pascals absolute. |
| P/kPg | XXX.XX | Pressure in kiloPascals absolute. |
| P/mV | XXX.XX | Pressure in millivolts. |
| P/VDC | ±X.XXXX | Pressure circuit voltage in volts DC. |

Table 3-6: Print-Out Symbols and Abbreviations (cont.)

| Mode/Unit | Number Format | Measurement Mode |
|-------------------------|---------------|---|
| Auxiliary Inputs | | |
| X1/VDC | ±X.XXXX | Auxiliary input #1 in volts. |
| X1/mA | ±XX.XXX | Auxiliary input #1 in milliamperes. |
| X1/ | ±XX.XXXX | Auxiliary input #1 in user-defined units. |
| X2/VDC | ±X.XXXX | Auxiliary input #2 in volts. |
| X2/mA | ±XX.XXX | Auxiliary input #2 in milliamperes. |
| X2/ | ±XX.XXXX | Auxiliary input #2 in user-defined units. |
| Other | | |
| VR/VDC | ±X.XXXX | Channel card reference voltage. |
| GD/VDC | ±X.XXXX | Channel card ground voltage. |

Note: *In the formats presented above, the plus/minus (\pm) symbol indicates that the data is signed and will be preceded by a plus (+) or minus (–) sign. The number of decimal places indicated is for nominal values. The instrument will maintain the number of digits by “floating” the decimal point to the right as the magnitude of the number increases. DO NOT “hard-code” the decimal points when using data acquisition software.*

Entering System Constants

A system constant is a fixed value for moisture (Kh), temperature (Kt), or pressure (Kp) entered into the **MMS-3** instead of using a “live” input. For example, if the process runs at a steady pressure, that pressure is entered into the **MMS-3** memory rather than using a pressure transmitter.

In addition, you can multiply the ppm_v value by a constant for special purposes. The default multiplier is 1.000.

Note: *To enter a constant multiplier for the oxygen cell, see Background Gas Correction Factors in Chapter 2 of the Service Manual. You must use a current multiplier for oxygen if you are using a different background gas than the one for which the cell was calibrated.*

IMPORTANT: *In order for the constant to work properly, you must make sure you also configured the channel for a constant (Kh, Kt or Kp) as described in Reconfiguring a Channel for a New Sensor on page 3-35.*

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-2 on page 3-48 to navigate to the System Menu.*

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Programming Menu 1
[SYSTEM] AUTOCAL▶

Use the arrow keys to move the brackets to SYSTEM and press [YES].

Measurement Mode 1
O [H] T P AUX1▶

You must now select the type of measurement the probe is capable of taking. Use the arrow keys to move to the desired measurement mode and press [YES]. See Table 3-7 on page 3-27 for a list of available measurement modes.

Entering System Constants (cont.)

Table 3-7: Measurement Modes

| Display Abbreviation | Measurement Mode |
|--|----------------------------|
| O* | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| AUX1* | Auxiliary 1 |
| AUX2* | Auxiliary 2 |
| CNST-PPMV | PPMv Multiplication Factor |
| *System constants are not available for these measurement modes. | |

| | |
|--------------------|---|
| System Menu | 1 |
| CURVES [CONSTANT]▶ | |

Use the arrow keys to move the brackets to CONSTANT and press [YES].

| | |
|---------------------|---|
| Const. Dew Point °C | 1 |
| +20.0 | |

Enter the constant value and press [YES].

Note: *The screen display varies, depending on the measurement mode selected.*

When the **MMS-3** displays measurements that are using a constant, it will insert or replace the first letter of the mode on the display with “K.” For example, the **MMS-3** will display DP as KP (dew point) or H as KH.

You may now do one of the following:

- To enter a constant for the other channel, press [NO] until you return to the Programming Menu (as shown on page 3-26).
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [NO] key followed by the [RUN] key.

Entering a Saturation Constant

The **MMS-3** requires a saturation constant in order to calculate parts per million by weight (ppm_w) in non-aqueous liquids. If the saturation constant of the process is unknown, contact GE Sensing. (Saturation constants are necessary for ppm_w in Henry's Law type liquids only. See Appendix A of the *Service Manual*.)

To enter a saturation constant, the user must enter 1 to 6 data points to represent a curve of Cs (saturation constant) versus temperature. Enter curves for each channel separately.

Press the [PROG] key to enter the user program.

| |
|----------------------|
| Enter Passcode: XXXX |
|----------------------|

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-2 on page 3-48 to navigate to the User Menu.*

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

| | |
|----------------------|---|
| Programming Menu | 1 |
| ◀[USER] LOGGER▶ | |

Use the arrow keys to move the brackets to USER and press [YES].

| | |
|---------------|---|
| User Menu | 1 |
| [SAT-CONST] ▶ | |

Use the arrow keys to move the brackets to SAT-CONST and press [YES].

| # | T(°C) | Cs | 1 |
|---|-------|----|---|
| 1 | +56 | 0 | |

If you want to begin entering data at the data point displayed, press the right arrow key to move the bracket to T/°C. Otherwise, enter the desired data point number. Press [YES] to confirm the entry. Then press the right arrow key.

| # | T(°C) | Cs | 1 |
|---|-------|----|---|
| 1 | +56 | 33 | |

Enter the desired temperature. Press [YES] to confirm the entry, and press the right arrow key.

| # | T(°C) | Cs | 1 |
|---|-------|----|---|
| 1 | +56 | 33 | |

Enter the corresponding saturation constant. Press [YES] to confirm the entry.

Entering a Saturation Constant (cont.)

Repeat the last three steps to enter all the information for each data point (maximum of six points). Enter the next data point number you want to enter over the present data point number and press the right arrow key. When you do this, the T/°C and Cs values will display values of the current saturation constant curve. This indicates you are ready to begin entering information for the selected data point.

You may now do one of the following:

- To enter a saturation constant for the other channel, press [NO] until you return to the Programming Menu on page 3-28.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [NO] key followed by the [RUN] key.

Using Computer Enhanced Response

Computer Enhanced Response uses a dynamic moisture calibration technique to extrapolate the moisture level to the end point when making measurements in abrupt “dry down” conditions. The system response time depends on the relative change in dew point. For a change from ambient moisture levels to trace levels, the unit can respond in three to five minutes.

The accuracy of Computer Enhanced Response is $\pm 2^{\circ}\text{C}$ of the reading the sensor would have read if it were allowed to reach equilibrium with the gas. To ensure that Computer Enhanced Response is as accurate as possible, your applications should:

- have a reasonably constant flow rate and final dew point.
- have a minimum flow rate of one standard cubic foot per hour (SCFH).
- operate at atmospheric pressure (0 psig).
- have an actual moisture content dew/frost point or wetter of -85°C .

Allow the sensor to reach equilibrium at ambient moisture levels before being exposed to the dry gas. Exposing the sensor to dew points of 5° to 10°C for ten minutes will enable the sensor to reach equilibrium.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, refer to Figure 3-2 on page 3-48 to navigate to the User Menu.*

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Programming Menu 1
 ◀[USER] LOGGER▶

Use the arrow keys to move the brackets to USER and press [YES].

User Menu 1
 ◀ [ENHANCED]

Use the arrow keys to move the brackets to ENHANCED and press [YES].

Using Computer Enhanced Response (cont.)

| | |
|-------------------|---|
| Enhanced Response | 1 |
| NO [YES] | |

Use the arrow keys to move the brackets to the desired selection and press [YES].

Press the [RUN] key and wait for the **MMS-3** to begin displaying measurements. Abruptly expose the sensor to dry gas.

IMPORTANT: *You must enable Computer Enhanced Response before you expose the sensor to dry gas. The **MMS-3** must see all the dry down in order to make an accurate calculation.*

When you activate Computer Enhanced Response for a channel, an EH replaces the H as the measurement mode. The **MMS-3** will display a reverse video E next to the channel number during dry down. The reverse video E will change to a regular E when the **MMS-3** determines the final value.

You may now do one of the following:

- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Setting Error Processing

The **MMS-3** provides Error Processing that enables you to specify how the recorders and alarms will respond to low and high range errors.

Low and high range errors occur when an input signal that is within the capacity of the analyzer exceeds the calibration range of the probe. The **MMS-3** displays an `UnderRng` message for low range errors and an `OverRng` message for high range error. Refer to *Range Error Description* in Chapter 2 of the *Service Manual* for more details on range errors.

The **MMS-3** outputs will also respond to signal and calibration errors. When a signal error occurs, the outputs will respond in the same manner as the high range error has been programmed. When a calibration error occurs, the outputs will respond in the same manner as the low range error has been programmed. For more details on signal and calibration errors, refer to *Signal Error Description* and *Calibration Error Description* in Chapter 2 of the *Service Manual*.

You can program separate actions for low and high range errors for the alarm relays and recorder outputs. The actions are independently programmable for each channel.

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Note: *If you have already entered the user program, see Figure 3-2 on page 3-48 to navigate to the System Menu.*

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Programming Menu 1
[SYSTEM] AUTOCAL▶

Use the arrow keys to move the brackets to SYSTEM and press [YES].

Setting Error Processing (cont.)

| | |
|------------------|---|
| Measurement Mode | 1 |
| O [H] T P Aux1▶ | |

You must now select the type of measurement the probe is capable of taking. Use the arrow keys to move to the desired measurement mode and press [YES]. See Table 3-8 below for a list of available measurement modes.

Table 3-8: Measurement Modes

| Display Abbreviation | Measurement Mode |
|----------------------|----------------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| AUX1 | Auxiliary 1 |
| AUX2 | Auxiliary 2 |
| CNST-PPMV | PPMv Multiplication Factor |

| | |
|-------------------|---|
| System Menu | 1 |
| ◀CONSTANT [ERROR] | |

Use the arrow keys to move the brackets to ERROR and press [YES].

| | |
|-------------------|---|
| Sel. ERROR Type | 1 |
| [LoRange] HiRange | |

Use the arrow keys to move the brackets to the desired selection and press [YES].

| | |
|-------------------|---|
| Sel. ERR Response | 1 |
| [ALM-A] ALM-B▶ | |

Use the arrow keys to move the brackets to the desired alarm or recorder and press [YES].

If you selected one of the ALARMS:

| | |
|----------------|---|
| Sel. ERR Alarm | 1 |
| [IGNORE] TRIP | |

Use the arrow keys to select whether you wish to trip or ignore the error and press [YES].

Refer back to the “Selecting Error Response” step to continue error processing.

**Setting Error Processing
(cont.)***If you selected one of the RECORDERS:*

| | |
|-------------------|---|
| Sel. ERR RCD Resp | 1 |
| IGNORE [HIGH]▶ | |

Use the arrow keys to select how the recorder will respond to a range error (ignore, go high, or go low) and press [YES].

To continue setting error processing, refer back to the “Selecting Error Response” step.

You may now do one of the following:

- Set error processing for the other channel by pressing [NO] until you return to the Programming Menu (as shown on page 3-32).
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

Reconfiguring a Channel for a New Sensor

If you decide to connect a different type of sensor to one of the channels of your unit, you must reconfigure that channel. For example, if you are using a moisture probe on channel 1 and later decide to connect an oxygen cell, you must “tell” (reconfigure) the **MMS-3** that you have changed the sensor.

Note: *If you are using a probe capable of multiple inputs (e.g., TF probe) or using more than one input (including a constant), you must configure the channel to measure all the possible inputs. Refer to the Multiple Input Instructions highlighted in this procedure.*

Note: *If you are already in the System Menu, proceed to the Measurement Mode step.*

Press the [PROG] key to enter the user program.

Enter Passcode: XXXX

Enter the passcode.

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Programming Menu 1
[SYSTEM] AUTOCAL▶

Use the arrow keys to move the brackets to SYSTEM and press [YES].

Measurement Mode 1
O [H] T P Aux1▶

Select the desired measurement mode and press [YES]. See Table 3-9 below for a list of available measurement modes.

Table 3-9: Measurement Modes

| Display Abbreviation | Measurement Mode |
|----------------------|----------------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| AUX1 | Auxiliary 1 |
| AUX2 | Auxiliary 2 |
| CNST-PPMV | PPMv Multiplication Factor |

Reconfiguring a Channel for a New Sensor (cont.)

| | |
|---------------------|---|
| System Menu | 1 |
| [CONFIG] REF ▶ | |

Use the arrow keys to move the brackets to CONFIG and press [YES].

| | |
|-------------------|---|
| Sel. HYGRO sensor | 1 |
| --- TF [Mxx]▶ | |

Use the arrow keys to move the brackets to the desired selection and press [YES]. Refer to Table 3-11 on page 3-38 for a list of available choices for each sensor. If you want to use a constant, select Kh for moisture, Kt for temperature, or Kp for pressure.

Note: *The word HYGRO will be replaced to reflect the measurement mode you previously selected.*

Multiple Input Instructions

Table 3-10 on page 3-37 shows a list of measurement modes that require multiple inputs and what you need to display them.

Example 1:

If you are using the TF Probe on channel 1, you must configure that channel for moisture, temperature and pressure. To do this, you must select TF under the CONFIG option for the H, T and P measurement modes.

Example 2:

If you are using an M Series Probe to measure moisture and a constant pressure on channel 1, you must configure that channel for both moisture and a constant pressure. To do this, you must select Mxx under the CONFIG option for the H measurement mode. You will also have to select Kp under the CONFIG option for the P measurement mode.

To select another measurement mode, press the [NO] key until you return to Measurement Mode and repeat the following steps to complete configuration. See Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 for menu maps.

When activating pressure sensors, the unit will prompt you to select which input (Aux 1 or Aux 2) the pressure sensor is connected to. After selecting the input, the display will prompt you to enter the probe signal in either current (I) or volts (V).

Table 3-10: Measurement Modes, Required Inputs and Configuration Information

| To measure: | Use these inputs: | Provided by: | (see page 3-35) Also configure the channel for: |
|-------------|---|--|--|
| RH | Temperature and moisture | TF Probe | TF (H, T, & P) |
| | | M Series Probe w/ temp. option | Mxx (H) and Kt (T) |
| | | M Series Probe & constant temperature | Mxx (H & T) |
| PPMv | Moisture and pressure | TF Probe w/ pressure option | TF (H, T & P) |
| | | M Series Probe and auxiliary pressure input | Mxx (H) and X1 (P) |
| | | M Series Probe and pressure constant | Mxx (H) and Kp (P) |
| PPBv | Moisture and pressure | TF Probe w/ pressure option | TF (H, T & P) |
| | | M Series Probe and auxiliary pressure input | Mxx (H) and X1 (P) |
| | | M Series Probe and pressure constant | Mxx (H) and Kp (P) |
| PPMw | Moisture, temperature and saturation constant | TF Probe w/ temperature option and saturation constant | TF (H & T) & refer to page 3-28 for saturation constant |
| | | M Series Probe w/ temperature option & saturation constant | Mxx (H & T) & refer to page 3-28 for saturation constant |
| | | TF Probe, constant temp. and saturation constant | TF (H), Kt (T); refer to page 3-28 for saturation constant |
| | | M Series Probe, constant temp. and saturation constant | M (H), Kt (T) & refer to page 3-28 for saturation constant |
| MCF/IG | Moisture and pressure | TF Probe w/pressure option | TF (H, T & P) |
| | | M Series Probe and auxiliary pressure input | Mxx (H) and X1 (P) |
| | | M Series Probe and pressure constant | Mxx (H) and Kp (P) |
| MCF/NG | Moisture and pressure | TF Probe w/ pressure option | TF (H, T & P) |
| | | M Series Probe and auxiliary pressure input | Mxx (H) and X1 (P) |
| | | M Series Probe and pressure constant | Mxx (H) and Kp (P) |
| PPMv/NG | Moisture and pressure | TF Probe w/ pressure option | TF (H, T & P) |
| | | M Series Probe and auxiliary pressure input | Mxx (H) and X1 (P) |
| | | M Series Probe and pressure constant | Mxx (H) and Kp (P) |

Reconfiguring a Channel for a New Sensor (cont.)

Table 3-11: Probe Types and Configurations

| Probe Type | Configurations |
|-------------|------------------------------------|
| Oxygen | N/A |
| | % (Percent) |
| | ppmv (Parts per Million by Volume) |
| Hygrometry | N/A |
| | TF (Three-Function Probe) |
| | Mxx (M Series Probe) |
| | Kh (Constant Dew Point) |
| Temperature | N/A |
| | TF (Three-Function Probe) |
| | Mxx (M-Series) |
| | Kt (Constant Temperature) |
| Pressure | N/A |
| | TF (Three-Function Probe) |
| | X1 (Auxiliary 1) |
| | X2 (Auxiliary 2) |
| | Kp (Constant Pressure) |
| Auxiliary 1 | N/A |
| | I (Current) |
| | V (Voltage) |
| Auxiliary 2 | N/A |
| | I (Current) |
| | V (Voltage) |

You can now do one of the following:

- Configure the other channel by pressing [NO] until you return to the Programming Menu. Then select the desired channel and repeat the procedure.
- Enter calibration data by pressing [NO] until you reach the Programming Menu. Then refer to *Entering Calibration Data for New Probes/Sensors* on page 3-39.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing [RUN].

IMPORTANT: *You must configure a channel AND enter the necessary calibration data for a sensor to work properly.*

Entering Calibration Data for New Probes/Sensors

The **MMS-3** needs calibration data for each moisture, oxygen and pressure sensor, as well as each auxiliary input. GE Sensing supplies each probe with a Calibration Data Sheet, which is a list of 1 to 16 data points the electronics needs to interpret raw data from the probe. Calibration Data Sheets are packed with each sensor.

Note: *If you want to enter a constant value for moisture, temperature, pressure, or multiply the ppm_v value by a constant multiplier, refer to Entering System Constants on page 3-26. It is not necessary to enter the calibration data if you are using a constant.*

Note: *If you have already entered the System Menu, and selected a channel and measurement mode, proceed to the CURVES selection step.*

Press the [PROG] key to enter the user program..

Enter Passcode: XXXX

Enter the passcode.

Be sure the number displayed in the upper right-hand corner of the screen is the channel you want to program. If not, press the [CHAN] key to select the desired channel.

Programming Menu 1
[SYSTEM] AUTOCAL▶

Use the arrow keys to move the brackets to SYSTEM and press [YES].

Measurement Mode 1
O [H] T P AUX1▶

You must now select the type of measurement the probe is capable of taking. Use the arrow keys to move to the desired measurement mode and press [YES]. Refer to Table 3-12 on page 3-40 for a list of available measurement modes.

Entering Calibration Data for New Probes/ Sensors (cont.)

Table 3-12: Measurement Modes

| Display Abbreviation | Measurement Mode |
|----------------------|----------------------------|
| O | Oxygen |
| H | Hygrometry |
| T | Temperature |
| P | Pressure |
| AUX1 | Auxiliary 1 |
| AUX2 | Auxiliary 2 |
| CONSTANT-PPMV | PPMv Multiplication Factor |

| | |
|-------------------------|---|
| System Menu | 1 |
| [CURVES] CONSTANT▶ | |

Use the arrow keys to move the brackets to CURVES and press [YES].

The remaining prompts depend on the type of sensor you are using. Refer to one of the following sections to properly program your unit:

- *Entering Moisture Curve Data* on page 3-41
- *Entering Oxygen Curve Data* on page 3-43
- *Entering Pressure Curve Data* on page 3-44
- *Entering Auxiliary Inputs Curve Data* on page 3-45.

Note: *You do not have to enter a temperature curve.*

Entering Moisture Curve Data

| | |
|------------------|---|
| MH Curve Menu | 1 |
| [S/N] #PTS CURVE | |

Use the arrow keys to move the brackets to S/N and press [YES].

| | |
|----------------|---|
| Probe Serial # | 1 |
| H: 123456 | |

Enter the serial number and press [YES]. The probe serial number is engraved on the probe mount. Then press [NO] to return to the Curve menu.

| | |
|------------------|---|
| MH Curve Menu | 1 |
| S/N [#PTS] CURVE | |

Use the arrow keys to move the brackets to #PTS and press [YES].

| | |
|------------------|---|
| Enter Total #PTS | 1 |
| 14 | |

Enter the total number of data points (1 to 16) and press [YES]. Refer to the Calibration Data Sheet for the number of data points. Then press [NO] to return to the Curve menu.

| | |
|------------------|---|
| MH Curve Menu | 1 |
| S/N #PTS [CURVE] | |

Use the arrow keys to move the brackets to CURVE and press [YES].

If you refer to your Calibration Data Sheet you will notice that the data points begin numbering at 0 (zero); therefore, the **MMS-3** displays the selected number of data points you entered (Step 4) minus 1.

| | | | |
|----|-------|--------|---|
| # | DP/°C | MH | 1 |
| 12 | +0.0 | 0.0000 | |

If you want to begin entering data at the data point displayed, press the right arrow key to move the bracket to DP/°C. Otherwise, enter the desired data point number. Press [YES] and press the right arrow key.

Entering Moisture Curve
Data (cont.)

| # | DP/°C | MH | 1 |
|----|-------|--------|---|
| 12 | +20.0 | 0.0000 | |

Enter the corresponding dew point. Press [YES] and press the right arrow key.

| # | DP/°C | MH | 1 |
|----|-------|-------|---|
| 12 | +20.0 | 1.046 | |

Enter the corresponding MH value. Press [YES] and press the right arrow key.

Repeat the last three steps to finish entering all the information for each data point. Enter the next data point number you want to enter over the present data point number and press the right arrow key. When you do this, the DP/°C and MH values will display as the last values entered. This indicates you are ready to begin entering information for the selected data point.

Note: *To review the moisture curve data, enter the number of the data point and press [YES].*

You may now do one of the following:

- Enter data for a different channel or type of sensor by pressing the [NO] key until you reach the Programming Menu, and then refer to *Entering Calibration Data for New Probes/Sensors* on page 3-39.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [NO] key followed by the [RUN] key.

IMPORTANT: *You must configure a channel AND enter the necessary calibration data in order for a sensor to work properly.*

Entering Oxygen Curve Data

| | |
|------------------|---|
| O2 Curve Menu | 1 |
| [S/N] CURVE BkGd | |

Use the arrow keys to move the brackets to S/N and press [YES].

| | |
|----------------|---|
| Probe Serial # | 1 |
| O2: 123456 | |

Enter the serial number and press [YES]. Refer to the Calibration Data sheet for the serial number. Press [NO] to return to the Curve Menu.

| | |
|------------------|---|
| O2 Curve Menu | 1 |
| S/N [CURVE] BkGd | |

Use the arrow keys to move the brackets to CURVE and press [YES].

| |
|--------------------|
| Sel. O2 Curve Pts# |
| [ZERO] SPAN |

Use the arrow keys to move the brackets to ZERO and press [YES].

| | | |
|----|-------|--------|
| #1 | O(uA) | O(ppm) |
| | 0.721 | 0.0000 |

Enter the zero microamp value (IO0) that is shown on the Calibration Data Sheet. Press [YES] and press the right arrow key.

| | | |
|----|-------|--------|
| #1 | O(uA) | O(ppm) |
| | 0.721 | 0.5000 |

Enter the zero ppmv (or %) value (OX0) and press [YES].

Press the [NO] key to return to the *Select O2 Curve Points* menu. Use the arrow keys to select SPAN and enter the span microamp (IO1), and ppmv or % (IO1) values.

You may now do one of the following:

- Enter data for a different channel or type of sensor by pressing the [NO] key until you reach the Programming Menu, and then refer to *Entering Calibration Data for New Probes/Sensors* on page 3-39.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

IMPORTANT: *You must configure a channel AND enter the necessary calibration data in order for a sensor to work properly.*

Entering Pressure Curve Data

| | |
|---------------------|---|
| Pressure Curve Menu | 1 |
| [S/N] CURVE | |

Use the arrow keys to move the brackets to S/N and press [YES].

| | |
|----------------|---|
| Probe Serial # | 1 |
| P: 123456 | |

Enter the serial number and press [YES]. Then press [NO] to return to the Curve Menu.

| | |
|---------------------|---|
| Pressure Curve Menu | 1 |
| S/N [CURVE] | |

Use the arrow keys to move the brackets to CURVE and press [YES].

| | | | |
|---|--------|-------|---|
| # | mA | Psig | 1 |
| 1 | +0.000 | 0.000 | |

Making sure the cursor is positioned below the # sign, enter a 1 (for zero) or 2 (for span). Press [YES] and then press the right arrow key.

| | | | |
|---|--------|-------|---|
| # | mA | Psig | 1 |
| 1 | +1.000 | 0.000 | |

Enter the mA value. Press [YES] and press the right arrow key.

| | | | |
|---|--------|-------|---|
| # | mA | Psig | 1 |
| 1 | +0.000 | 2.000 | |

Enter the psig value. Press [YES].

Repeat the three previous steps to enter the remaining data. You must enter the necessary data for zero and span.

You may now do one of the following:

- Enter data for a different channel or type of sensor by pressing the [NO] key until you reach the Programming Menu, and then refer to *Entering Calibration Data for New Probes/Sensors* on page 3-39.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

IMPORTANT: *You must configure a channel AND enter the necessary calibration data in order for a sensor to work properly.*

Entering Auxiliary Input Curve Data

| | |
|------------------|---|
| Aux Curve Menu | 1 |
| [S/N] #PTS CURVE | |

Use the arrow keys to move the brackets to AUX1 (or AUX2), depending on where the sensor is connected, and press [YES].

Note: *S/N is not available in this menu.*

| | |
|------------------|---|
| Aux Curve Menu | 1 |
| S/N [#PTS] CURVE | |

Use the arrow keys to move the brackets to #PTS and press [YES].

| | |
|------------------|---|
| Enter Total #PTS | 1 |
| 2 | |

Enter the number of data points and press [YES]. Then press [NO] to return to the Curve Menu.

Note: *For linear devices only two data points are required; a maximum of eight data points may be entered for other devices. Each data point requires a current or voltage value with a corresponding scale value in the units you want to output.*

| | |
|------------------|---|
| Aux Curve Menu | 1 |
| S/N #PTS [CURVE] | |

Use the arrow keys to move the brackets to CURVE and press [YES].

| | | | |
|---|--------|-------|---|
| # | mA/VDC | Units | 1 |
| 2 | +0.000 | 0.000 | |

If you want to begin entering data at the data point displayed, press the right arrow key to move the bracket to X1 (mA or V). Otherwise, enter the desired data point number. Press [YES] and press the right arrow key.

| | | | |
|---|--------|-------|---|
| # | mA/VDC | Units | 1 |
| 2 | +1.000 | 0.000 | |

Enter the mA/VDC value. Press [YES] and press the right arrow key.

| | | | |
|---|--------|--------|---|
| # | mA/VDC | Units | 1 |
| 2 | +1.000 | 20.000 | |

Enter the units value and press [YES].

Repeat the last three steps to enter the remaining data.

Entering Auxiliary Input Curve Data (cont.)

You may now do one of the following:

- Enter data for a different channel or type of sensor by pressing the [NO] key until you reach the Programming Menu, and then refer to *Entering Calibration Data for New Probes/Sensors* on page 3-39.
- Refer to another section and perform a different procedure. Refer to Figure 3-2 on page 3-48 and Figure 3-3 on page 3-49 to navigate through the user program.
- Exit by pressing the [RUN] key.

IMPORTANT: *You must configure a channel AND enter the necessary calibration data in order for a sensor to work properly.*

Loading New Software

At some point, a new version of the **MMS-3** operating software may be released. To update your system, use the following guidelines:

1. Record all of the setup, configuration, calibration and reference information from the **MMS-3**, and transfer required logs to a PC.

IMPORTANT: *All of the settings will be lost when the code is updated. Any logs will also be erased.*

2. Obtain the new software file (with a *.cod extension) and save the file to your PC hard drive.
3. Set up the **MMS-3** with an RS232 cable connected to a COM port (most likely COM1) on a PC having a communications program like Hyperterminal. (See *Connecting a Personal Computer or Printer* in Chapter 1 of the *Service Manual*.)
4. Start the communications program on the PC and select the COM port with the connection to the **MMS-3**.
5. Set the following information:
 - Baud Rate = **19200**
 - Data Bits = **8**
 - Parity = **none**
 - Stop Bits = **1**
 - Flow Control = **none**.
6. Turn on the power to the **MMS-3**.
7. Press the **0** (zero) key on the **MMS-3**.

Note: *The display will indicate a message similar to Reload Flash via RS232 (Y/N)?*

8. Press the **YES** key on the **MMS-3**.
9. Using the PC communications program, choose the **Transfer** file menu and select **Send File**.
10. Select the XMODEM transfer protocol.
11. Select the file to send: the file that was saved to the PC hard drive.

The File transfer will commence. Once the file is successfully transferred, the meter will reboot and load the new software.

Note: *Once the software is loaded into the **MMS-3**, it will be necessary to reprogram the configuration data, references, recorders, alarms, logs, etc. (see the previous sections in this manual).*

After reprogramming is complete, the **MMS-3** is ready for operation.

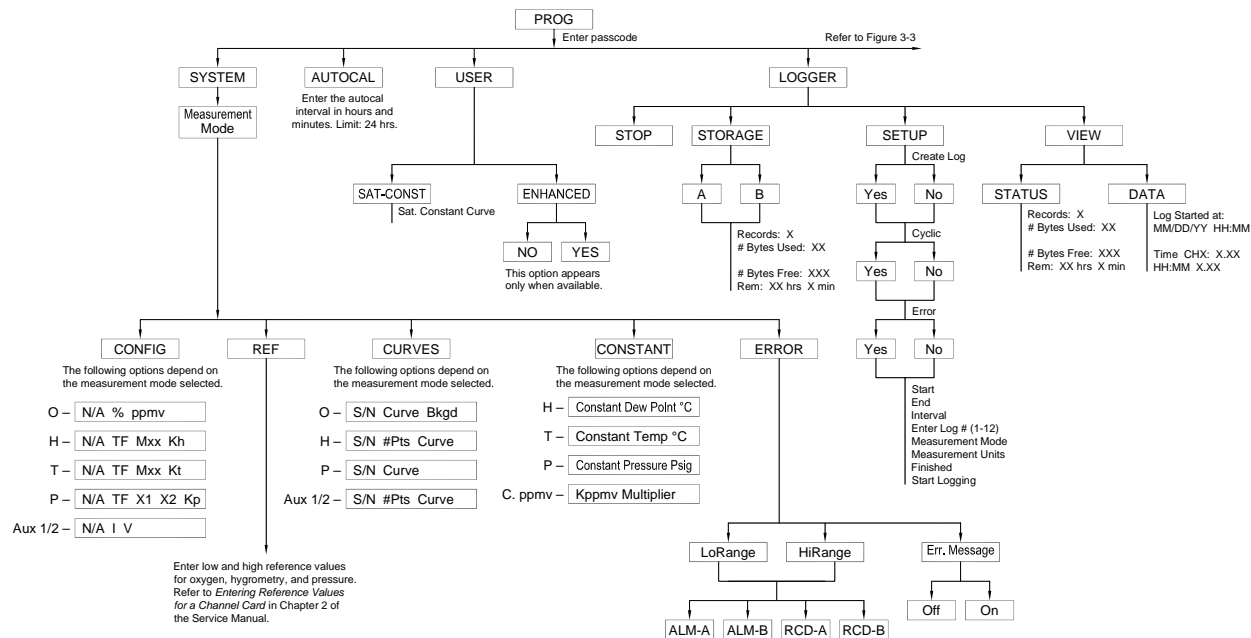


Figure 3-2: Program Menu Map (sht. 1 of 2)

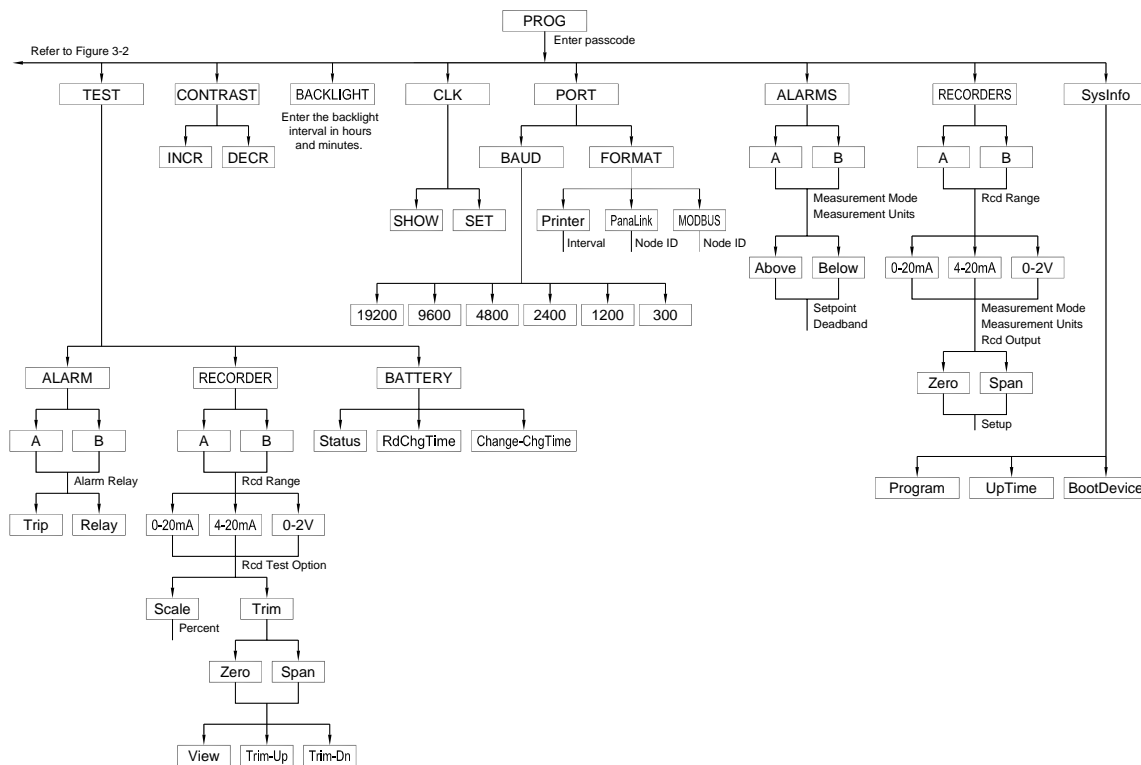


Figure 3-3: Program Menu Map (sht. 2 of 2)

Chapter 4

Programming with PanaView

| | |
|--|------|
| Introduction..... | 4-1 |
| Changing Measurement Modes and Units | 4-1 |
| Changing Alarm Settings | 4-4 |
| Changing Recorder Settings | 4-6 |
| Programming User Functions | 4-9 |
| Entering User Tables | 4-11 |
| Entering Saturation Constants | 4-12 |
| Checking the Battery and Backlight | 4-13 |

Introduction

The optional PanaView™ software package enables you to remotely change the programming of the **MMS-3**. In addition to displaying meter measurements on your PC, you can vary the modes and display units on individual channels, and add, change or delete user equations and user tables. You can also check the status of the meter battery and backlight. For a complete explanation of PanaView's capabilities, see the PanaView *User's Manual* (910-211).

IMPORTANT: *Before attempting to display or change programming with the PC, be sure to install PanaView as described in Chapter 1 of the PanaView User's Manual (910-211).*

Changing Measurement Modes and Units

PanaView enables you to change the measurements on the matrix display. For example, through the PC, you can switch a line from its original programming of measuring oxygen in parts-per-million to new programming of measuring pressure at psig — or leave the line entirely blank. To change meter programming:

1. From the “*File*” menu, click on the “*New Meter Browser*” option.
2. From the network tree, click on the desired communications port (COM 1, etc.) and meter.
3. From the expanded tree, click on the “*Display*” option. A list of two channels appears. Clicking on either channel opens the list of modes (temperature, hygrometry, oxygen, etc.) and display units currently assigned for that channel.
4. Double-clicking on any channel opens the “*Meter Display*” window, shown in Figure 4-1 on page 4-2. Each individual blue window shows the mode and unit measured in the corresponding window on the **MMS-3**, with the assigned channel number in the upper left corner. A line below indicates which page the meter is currently displaying.
5. To scroll to a particular page, click on the left or right pointer buttons at the bottom of the window.

Note: *While each window shows the sensor and units measured, you must click on “Text Display,” from the “Output” menu, or view the **MMS-3** screen, to see the actual measurements at any given time.*

Changing Measurement Modes and Units (cont.)

To change meter programming:

1. Click on the window to be changed. The selected window turns red.
2. Click on the desired meter on the network tree on the left of the programming window. The tree expands to show a list of available sensors.
 - a. Click on the desired sensor, and the tree expands further to show a list of available units.
 - b. Double-click on the unit, and the **MMS-3** reassigns the selected box, on the **MMS-3** and on the Matrix Display screen.
 - c. To unassign a mode and unit without assigning a different sensor, click on the desired window and then on [Unassign].

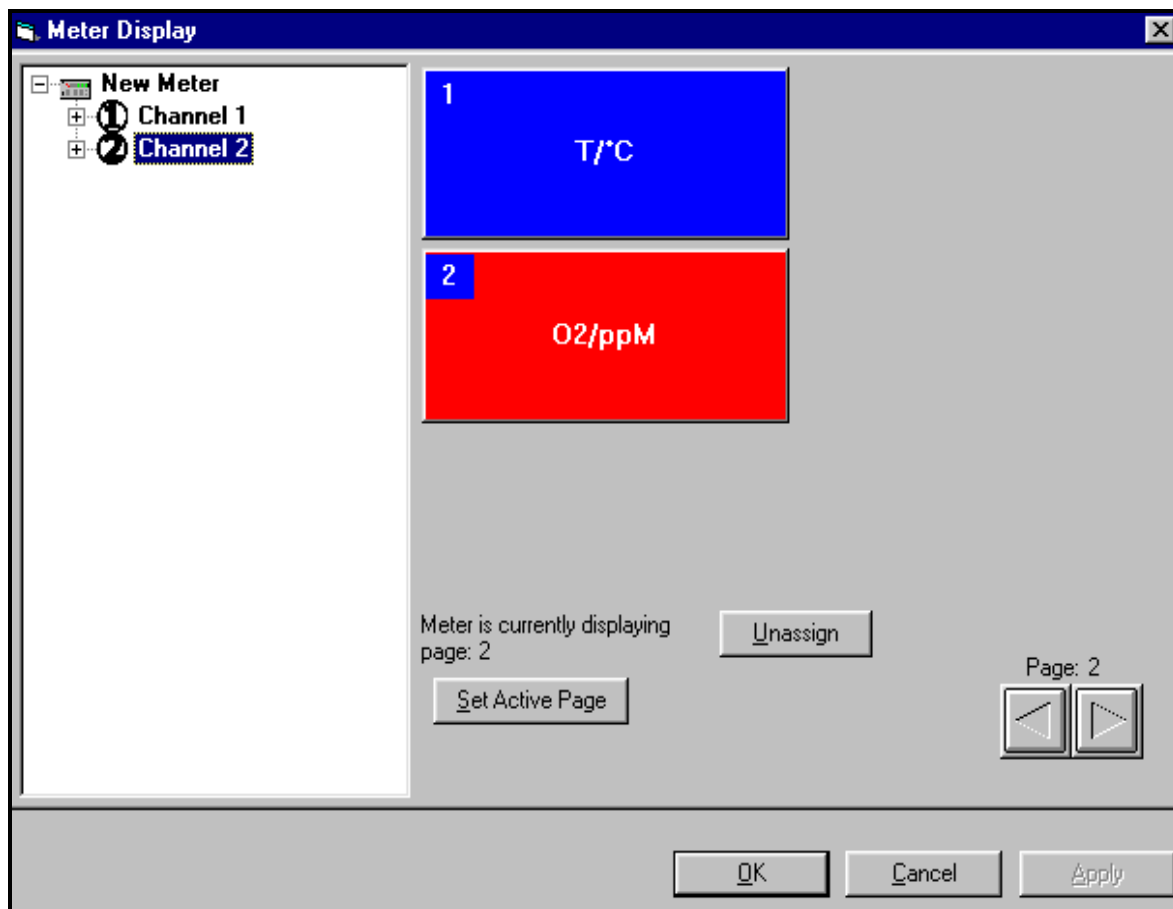


Figure 4-1: The Meter Display Window

Changing Measurement Modes and Units (cont.)

Figure 4-2 below shows a typical change on the PC screen from O₂/ppm (shown in Figure 4-1 on page 4-2) to PSIg.

Note: For an explanation of unit abbreviations, see the *Measurement Modes and Units* table in Chapter 2.

3. Click [Apply] to apply the change immediately and continue programming, and [OK] to confirm the change and close the window.

Note: To return the window to its previous settings, click on the [Cancel] button instead of the [OK] button.

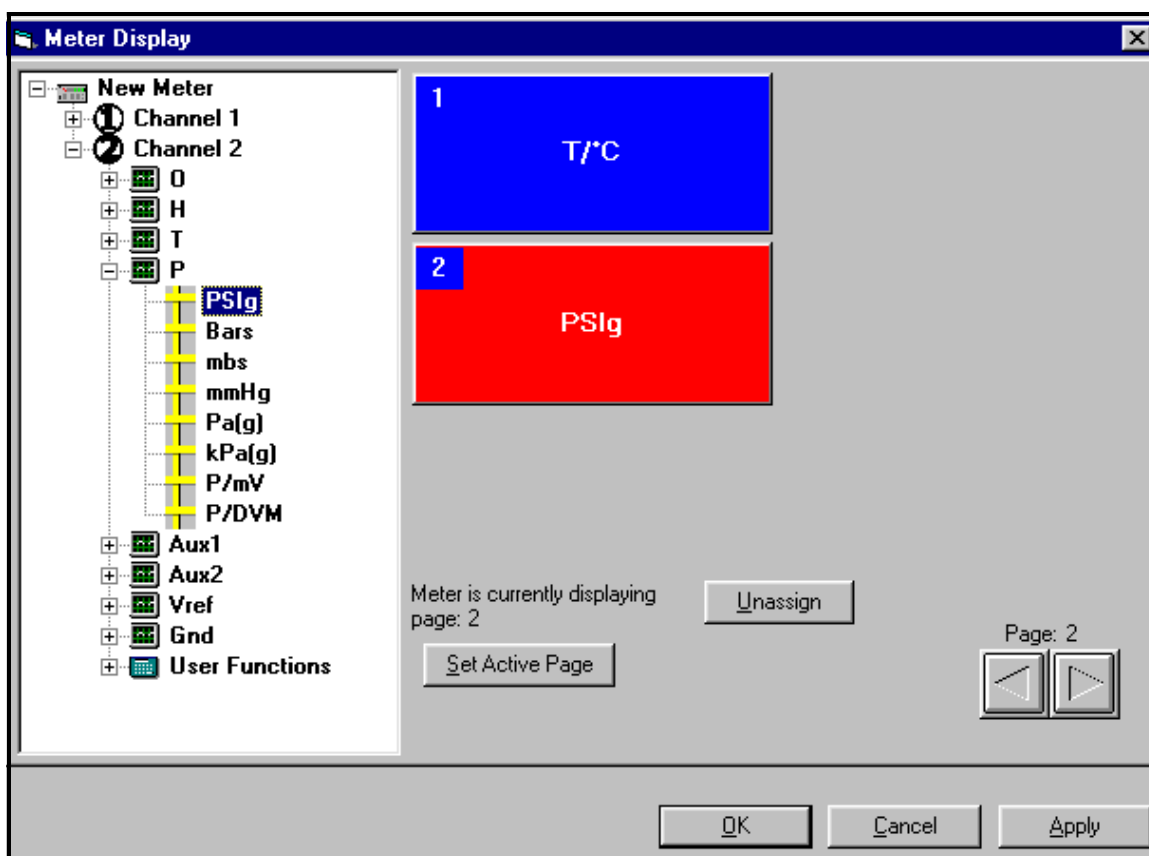


Figure 4-2: Matrix Display After Programming

Changing Alarm Settings

PanaView enables you to set or change alarm settings for the **MMS-3**. You can determine which sensor and unit serve as the alarm, the trip and deadband values, and the alarm's reaction to errors.

1. From the “*New Meter Browser*” option, pull down the desired meter, and click on the desired channel.
2. From the channel menu, click on the Alarms option, and then on “Alarm A” or “Alarm B.” The Alarm window appears, as shown in Figure 4-3 below.

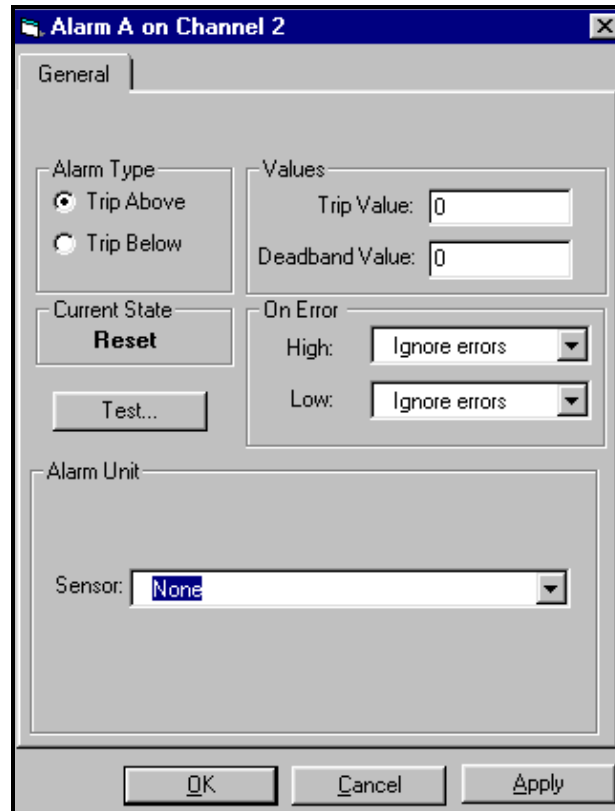


Figure 4-3: Alarm Programming Window

3. To set the alarm sensor and unit
 - a. Pull down the “*Sensor*” list box in the lower part of the window.
 - b. Then click on the desired sensor type.
 - c. A list of units appears. Click on the desired unit.
4. To set the alarm type, click on the [Trip Above] or [Trip Below] radio buttons, as desired.

**Changing Alarm Settings
(cont.)**

5. To determine the alarm values, enter the Trip and Deadband values in the designated text boxes on the window. (For a definition of the Deadband value, see *Setting Up the Alarms* in Chapter 3.)
6. To determine how the alarm will react when it encounters an error:
 - a. Pull down the “*High*” list box under the “On Error” line.
 - b. Then click on the desired action from the listing: “Ignore error,” “Trip on error,” “Reset on error,” or “Hold on last error.”
 - c. Repeat the procedure for the “*Low*” list box.
7. To test the alarm, click on the [Test] button. Click on the [Trip] button to trip the alarm, and on the [Reset] button to reset it.
8. Click on [Apply] to immediately apply the changes, and on [OK] to confirm the changes and close the window. (To return the window to its previous settings, click on the [Cancel] button.)

Changing Recorder Settings

You may also change the settings of a recorder attached to the **MMS-3**: the input type, zero and span values, and how it performs error handling.

Setting Recorder Values

1. From the “*New Meter Browser*” option, click on the desired meter and channel.
2. From the channel menu, click on the “*Recorders*” option, and then on “*Recorder A*” or “*Recorder B*.” The Recorder Properties window appears, as shown in Figure 4-4 below.
3. To set the recorder type, pull down the “*Type*” list box and click on one of the three choices: 0 to 20 mA, 4 to 20 mA and 0 to 2 V.
4. To set the recorder unit, pull down the “*Sensor/Class*” list box and click on the desired sensor. Then pull down the “*Unit*” list box and select from the available units.
5. To establish the input settings, enter the desired values in the “*Zero*” and “*Span*” text boxes.
6. Click on [Apply] to apply the changes immediately, and on [OK] to confirm the changes and close the window. To return the window to its previous settings, click on the [Cancel] button.

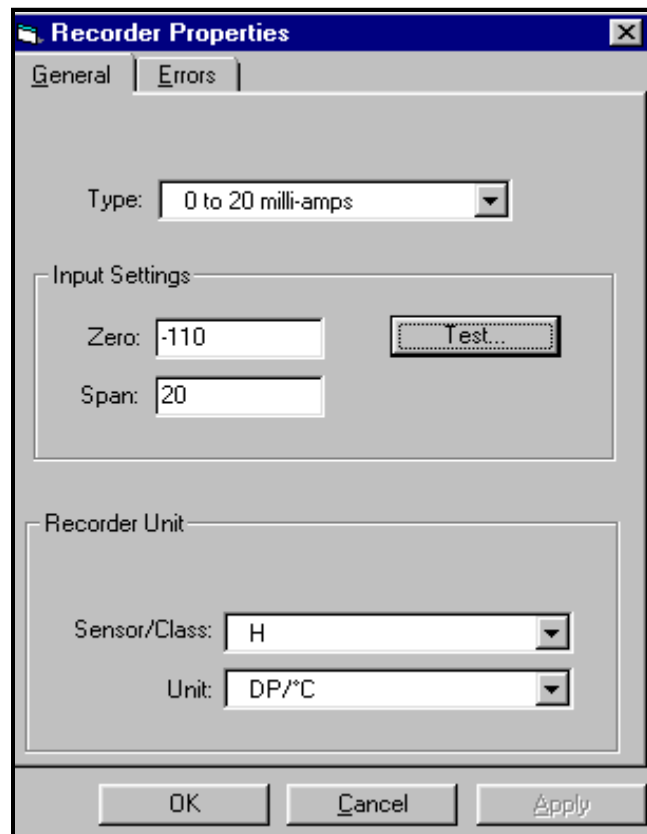


Figure 4-4: Recorder Properties Window

Testing Recorder Outputs

1. To test the recorder outputs, click on the [Test] button shown in the “*Recorder Properties*” window (Figure 4-4 on page 4-6). A message appears: “This will suspend Recorder #[X] on Channel [X]. Are you sure you want to test this recorder?” Click on [OK] to continue.
2. The “*Test Recorder*” window appears, as shown in Figure 4-5 below. At the top, slide the pointer to the desired percentage of the full scale recorder range, and click on [OK].
3. To trim the recorder outputs, scroll the arrows to the right of the “*Zero*” and “*Span*” windows up or down until you reach the desired values, and click on [OK].

Note: *For a complete discussion of testing and trimming recorder outputs, refer to the sections Testing the Recorder Outputs and Trimming the Recorder Outputs in Chapter 2 of the Service Manual.*

The screen returns to the “*Recorder Properties*” window.

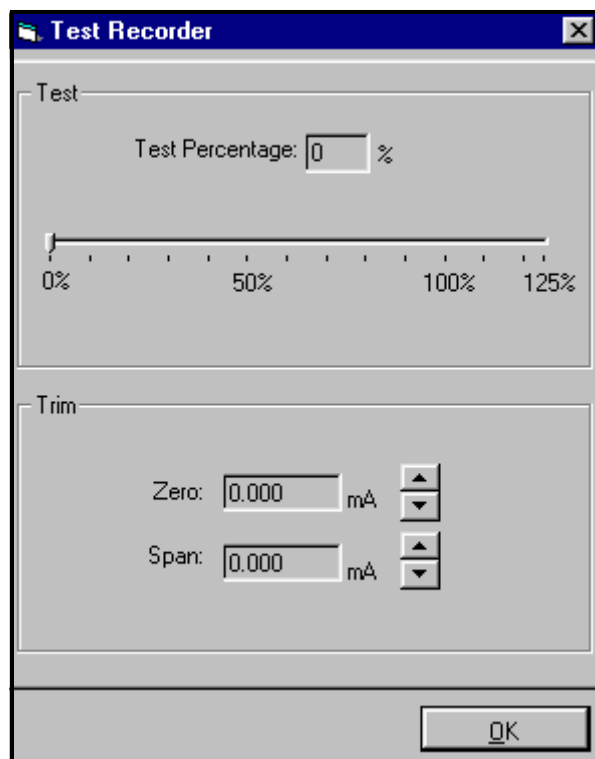


Figure 4-5: Recorder Test Window

Programming Error Handling

1. To program the **MMS-3** for error handling, click on the “*Errors*” tab. The screen appears similar to Figure 4-6 below.
2. Enter the desired values for the low and high error settings in the appropriate text boxes.
3. To program the meter’s response to errors, pull down the “*On Low Error*” list box, and click on one of five choices:
 - Ignore error
 - Go to high limit
 - Go to low limit
 - Hold last value
 - Go to error value.
4. Repeat this selection with the “*On High Error*” list box.
5. Click on [Apply] to apply the changes immediately, and on [OK] to confirm the changes and close the window. To return the window to its previous settings, click on the [Cancel] button.

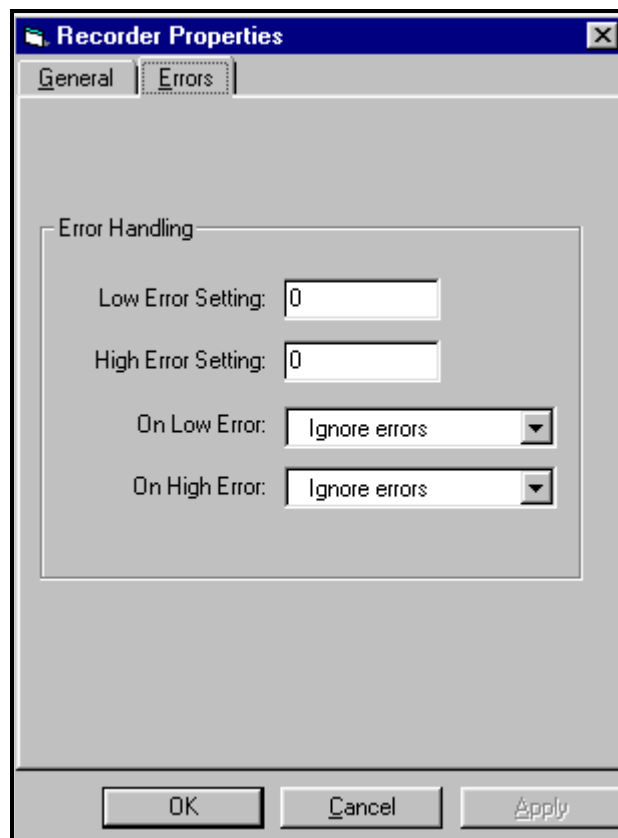


Figure 4-6: Error Handling Tab

Programming User Functions

User functions enable operators to program up to four desired equations on each channel, or to use any measured parameter to calculate a different parameter. PanaView allows users to program or change user functions and related tables through the PC.

To program a user function:

1. From the “*New Meter Browser*” option, click on the desired communications port, meter, and channel.
2. Click on “*User Functions*,” and then double-click on the desired function (1 to 4). The right side of the screen will appear similar to Figure 4-7 below.
3. Enter three parameters in the designated text boxes:
 - a function label (of no more than 16 characters)
 - a function symbol (no more than 4 characters)
 - the number of decimal places desired.
4. To incorporate an existing parameter, pull down the network tree and click on the desired channel, sensor and display unit.

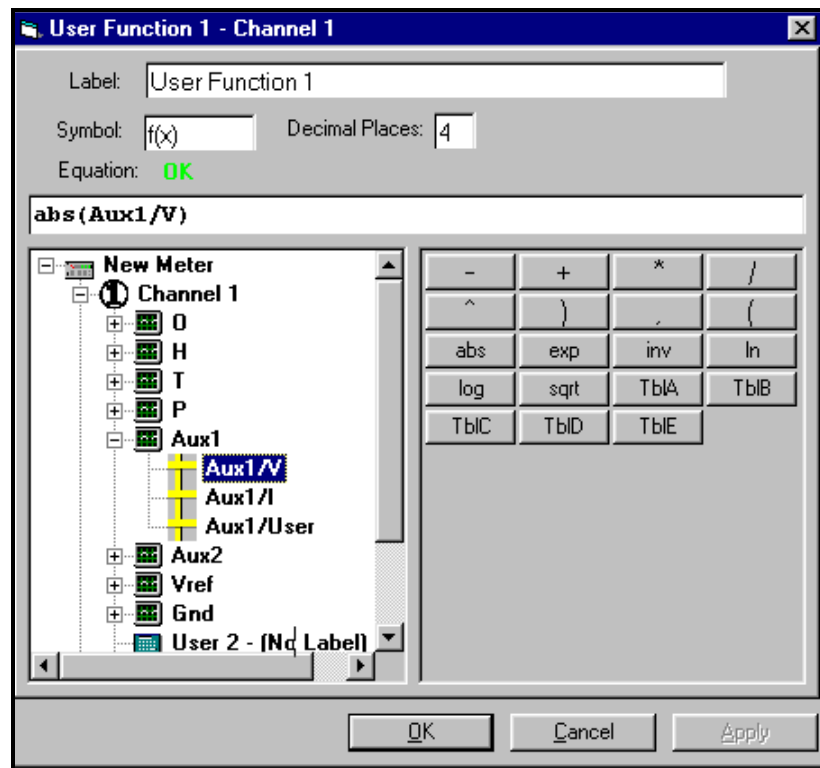


Figure 4-7: The User Function Window

Programming User Functions (cont.)

5. To select the desired operation or table, click on the appropriate button. (See *Entering User Tables* on page 4-11 for information on entering data for user tables.) Use the cursor in the equation text window to position values correctly, or to erase incorrect values or operations.
6. When you have completed entering the function, click on [Apply] to apply the function immediately, and on [OK] to confirm the function and close the window. To return the window to its previous settings, click on the [Cancel] button.

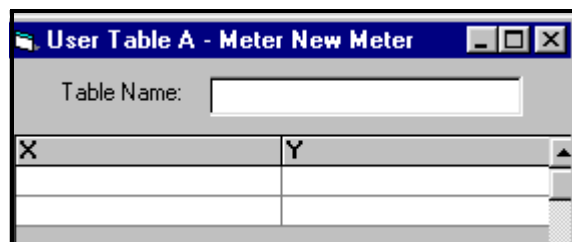
Note: *It may be advisable to use the [Apply] button as a means of checking the function's validity. If the function is improperly typed, or if a sensor is under range or not programmed, the Equation line displays "Invalid" with a brief message.*

Entering User Tables

To support user functions, the **MMS-3** can hold up to five tables (designated as A through E) of non-linear or empirical data. Users can enter up to 16 X-Y pairs in each table. A user function can supply an X value with Tbl(). The **MMS-3** then interpolates the Y value for a given X, and substitutes it for Tbl (X) in the function.

To enter values for a user table:

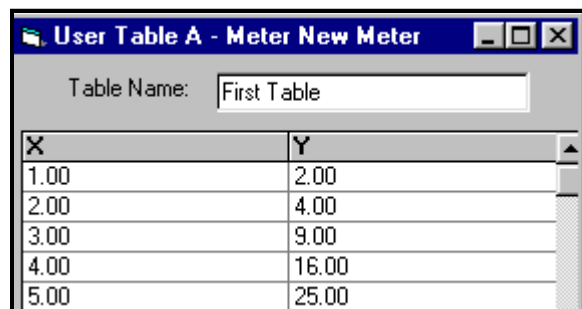
1. From the “*New Meter Browser*” option, click on the desired communications port and meter.
2. Click on “*User Tables*,” and then double-click on the desired table. The right side of the screen appears similar to Figure 4-8 below.



| X | Y |
|---|---|
| | |
| | |
| | |

Figure 4-8: Blank User Table

3. Enter a name (up to 13 characters) for the table in the “Table Name” text box, and enter up to 16 X and Y values in the appropriate columns. The table now appears similar to Figure 4-9 below.



| X | Y |
|------|-------|
| 1.00 | 2.00 |
| 2.00 | 4.00 |
| 3.00 | 9.00 |
| 4.00 | 16.00 |
| 5.00 | 25.00 |

Figure 4-9: Completed User Table

4. When you have finished entering values, click on [Apply] to apply the table immediately, and on [OK] to confirm the table and close the window. To return the window to its previous settings, click on the [Cancel] button.

Entering Saturation Constants

To enter a saturation constant, you must enter 1 to 6 data points to represent a curve of C_s (saturation constant) versus temperature. (For more information, see *Entering a Saturation Constant* in Chapter 3.) PanaView enables you to enter a saturation constant curve for each channel. To enter a curve:

1. From the “*New Meter Browser*” option, click on the desired communications port, meter, and channel.
2. From the “*Edit*” menu, select the “*Properties*” option. The “*Constant Saturation Table*” window appears, as shown in Figure 4-10 below.
3. Enter up to six data points to establish a curve of saturation constants versus temperature.
4. The window also allows you to specify whether you wish Enhanced Response for the channel. Enhanced Response uses a dynamic moisture calibration technique to extrapolate the moisture level to the end point when making measurements in abrupt “dry down” conditions. (For more information, refer to *Using Computer Enhanced Response* in Chapter 3.) Click the appropriate radio button to turn Enhanced Response *on* or *off*.
5. When you have finished entering values, click on [Apply] to apply the table immediately, and on [OK] to confirm the table and close the window. To return the window to its previous settings, click on the [Cancel] button.

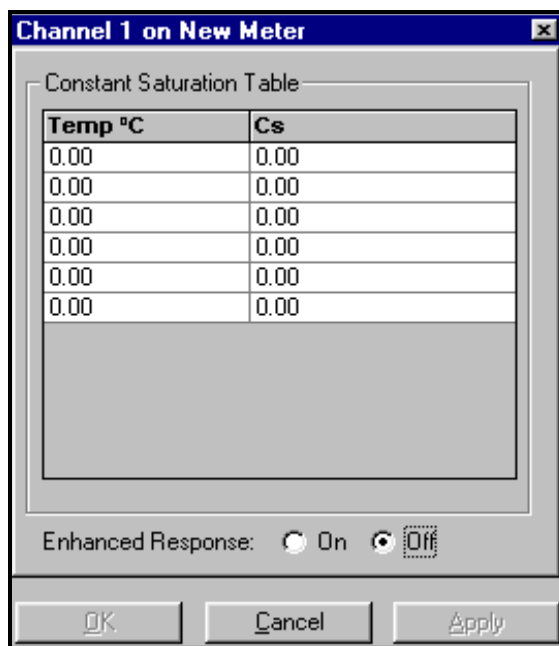


Figure 4-10: Constant Saturation Table

Checking the Battery and Backlight

If your **MMS-3** has the battery option, you can use PanaView to check on the battery status and backlight settings. To check on the battery from PanaView:

1. From the “*New Meter Browser*” option, click on the desired communications port and meter.
2. From the network tree, double-click on “*Battery/Backlight*.” The “*Battery/Backlight Status*” window appears, as shown in Figure 4-11 below.
3. The window shows the presence (or absence) of a battery, along with its power source, voltage, charge time and remaining time to run. To recharge the battery, click on [Full Charge].
4. The window also shows if the backlight is on and how long the backlight timeout is. Use the numeric keys to enter a backlight interval in minutes from 0 to 960 (16 hours) in the text box. If you enter 0 (zero) the backlight will turn off.
5. Click on [Apply] to apply the settings immediately, and on [OK] to confirm the settings and close the window. To return the window to its previous settings, click on the [Cancel] button.

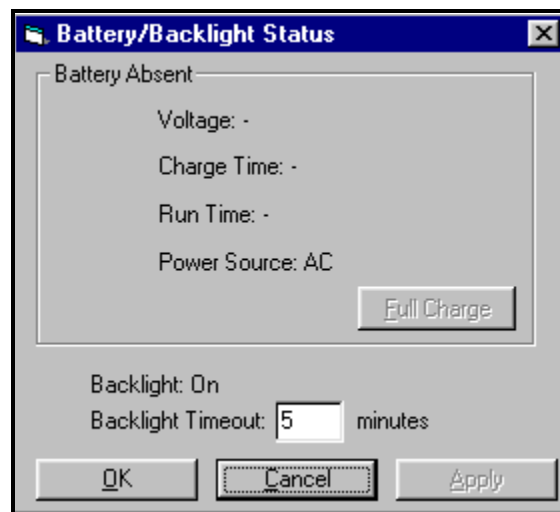


Figure 4-11: Battery/Backlight Status

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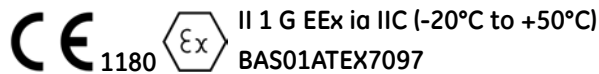
We,

GE Infrastructure Sensing, Inc.
1100 Technology Park Drive
Billerica, MA 01821-4111
U.S.A.

as the manufacturer, declare under our sole responsibility that the product

Moisture Monitor Series 3 Analyzer

to which this document relates, in accordance with the provisions of ATEX Directive 94/9/EC Annex II, meets the following specifications:



Furthermore, the following additional requirements and specifications apply to the product:

- Having been designed in accordance with EN 50014 and EN 50020, the product meets the fault tolerance requirements of electrical apparatus for category “ia”.
- The product is an electrical apparatus and must be installed in the hazardous area in accordance with the requirements of the EC Type Examination Certificate. The installation must be carried out in accordance with all appropriate international, national and local standard codes and practices and site regulations for flameproof apparatus and in accordance with the instructions contained in the manual. Access to the circuitry must not be made during operation.
- Only trained, competent personnel may install, operate and maintain the equipment.
- The product has been designed so that the protection afforded will not be reduced due to the effects of corrosion of materials, electrical conductivity, impact strength, aging resistance or the effects of temperature variations.
- The product cannot be repaired by the user; it must be replaced by an equivalent certified product. Repairs should only be carried out by the manufacturer or by an approved repairer.
- The product must not be subjected to mechanical or thermal stresses in excess of those permitted in the certification documentation and the instruction manual.
- The product contains no exposed parts which produce surface temperature infrared, electromagnetic ionizing, or non-electrical dangers.



We,

**Panametrics Limited
Shannon Industrial Estate
Shannon, County Clare
Ireland**

declare under our sole responsibility that the

**Moisture Image Series 1 Analyzer
Moisture Image Series 2 Analyzer
Moisture Monitor Series 3 Analyzer**

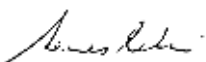
to which this declaration relates, are in conformity with the following standards:

- EN 50014:1997+A1+A2:1999
- EN 50020:1994
- II (1) G [EEx ia] IIC
BAS01ATEX7097
Baseefa (2001) Ltd/EECS, Buxton SK17 9JN, UK
- EN 61326:1998, Class A, Annex A, Continuous Unmonitored Operation
- EN 61010-1:1993+A2:1995, Overvoltage Category II, Pollution Degree 2

following the provisions of the 89/336/EEC EMC Directive, the 73/23/EEC Low Voltage Directive and the 94/9/EC ATEX Directive.

The units listed above and any sensors and ancillary sample handling systems supplied with them do not bear CE marking for the Pressure Equipment Directive, as they are supplied in accordance with Article 3, Section 3 (sound engineering practices and codes of good workmanship) of the Pressure Equipment Directive 97/23/EC for DN<25.

Shannon - July 1, 2003


Mr. James Gibson
GENERAL MANAGER



CERT-DOC-H2



August 2004

Nous,

**Panametrics Limited
Shannon Industrial Estate
Shannon, County Clare
Ireland**

déclarons sous notre propre responsabilité que les

**Moisture Image Series 1 Analyzer
Moisture Image Series 2 Analyzer
Moisture Monitor Series 3 Analyzer**

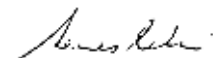
relatif à cette déclaration, sont en conformité avec les documents suivants:

- EN 50014:1997+A1+A2:1999
- EN 50020:1994
- II (1) G [EEx ia] IIC
BAS01ATEX7097
Baseefa (2001) Ltd/EECS, Buxton SK17 9JN, UK
- EN 61326:1998, Class A, Annex A, Continuous Unmonitored Operation
- EN 61010-1:1993+A2:1995, Overvoltage Category II, Pollution Degree 2

suivant les règles de la Directive de Compatibilité Electromagnétique 89/336/EEC, de la Directive Basse Tension 73/23/EEC et d'ATEX 94/9/EC.

Les matériels listés ci-dessus, ainsi que les capteurs et les systèmes d'échantillonnages pouvant être livrés avec ne portent pas le marquage CE de la directive des équipements sous pression, car ils sont fournis en accord avec la directive 97/23/EC des équipements sous pression pour les DN<25, Article 3, section 3 qui concerne les pratiques et les codes de bonne fabrication pour l'ingénierie du son.

Shannon - July 1, 2003



Mr. James Gibson
DIRECTEUR GÉNÉRAL



CERT-DOC-H2



August 2004

Wir,

Panametrics Limited
Shannon Industrial Estate
Shannon, County Clare
Ireland

erklären, in alleiniger Verantwortung, daß die Produkte

Moisture Image Series 1 Analyzer
Moisture Image Series 2 Analyzer
Moisture Monitor Series 3 Analyzer

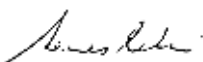
folgende Normen erfüllen:

- EN 50014:1997+A1+A2:1999
- EN 50020:1994
- II (1) G [EEx ia] IIC
BAS01ATEX7097
Baseefa (2001) Ltd/EECS, Buxton SK17 9JN, UK
- EN 61326:1998, Class A, Annex A, Continuous Unmonitored Operation
- EN 61010-1:1993+A2:1995, Overvoltage Category II, Pollution Degree 2

gemäß den Europäischen Richtlinien, Niederspannungsrichtlinie Nr.: 73/23/EG, EMV-Richtlinie Nr.: 89/336/EG und ATEX Richtlinie Nr. 94/9/EG.

Die oben aufgeführten Geräte und zugehörige, mitgelieferte Sensoren und Handhabungssysteme tragen keine CE-Kennzeichnung gemäß der Druckgeräte-Richtlinie, da sie in Übereinstimmung mit Artikel 3, Absatz 3 (gute Ingenieurpraxis) der Druckgeräte-Richtlinie 97/23/EG für DN<25 geliefert werden.

Shannon - July 1, 2003



Mr. James Gibson
GENERALDIREKTOR



CERT-DOC-H2



August 2004



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